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GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

Report of the CHILD NUTRITIONAL STATUS SURVEY 1989-90

APRIL, 1991

BANGLADESH BUREAU OF STATISTICS

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APRIL, 1991

BANGLADESH BUREAU OF STATISTICS
STATISTICS DIVISION, MINISTRY OF PLANNING
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
DHAKA, BANGLADESH

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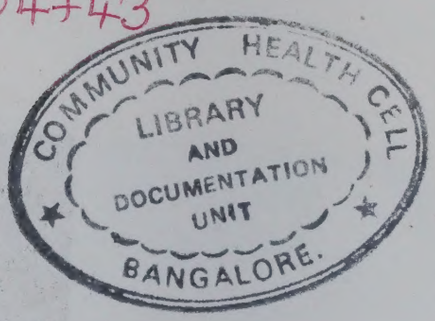

PREFACE

The Bangladesh Bureau of Statistics (BBS) is responsible for collection, compilation and dissemination of information on a variety of subjects.

BBS collects information on household income, expenditure consumption and other economic indicators through Household Expenditure Survey (HES). A Child Nutritional Status Assessment Survey was started from 1985-86. This survey followed the same sample as covered by HES 1985-86.

Again in 1989-90 Child Nutrition Survey was done covering almost fifty percent of the HES (1988-89) sample. These were cooperative effort among BBS, the United Nations Household Survey Capability Programme (UNHSCP), New York and UNICEF, Dhaka.

This is the second time in Bangladesh as well as BBS a nationwide Child Nutrition Survey was done. Since nutritional status data were collected from the same households as the HES, descriptions of nutritional status by HES classification was possible. Income and expenditure variables have been analyzed in relation to nutritional status in this report. It is hoped that the results of this survey will serve as a baseline data set and will meet the needs of programme planners and researchers.

According to the comments and suggestions made after the first survey results second survey was finalized. Z-score analysis is included in the second Child Nutrition Status Survey report. Appreciation is expressed to the members of the planning committee for their valuable contributions.

Gratitude is expressed to all those who were involved in this endeavor.

Mr. Hamidur Rahman, Director-in-Charge, Computer and Data Processing wing, Mr. Mahmudul Haque, Statistical Officer and Mr. Abdul Wadud, Assistant Statistical Officer made valuable contributions in timely processing of the survey results.

Dr. Mahmud Khan, UNICEF Consultant provided assistance in Z-score analysis of the data and finalization of this report. His contribution is very much appreciated. Mr. Shahadat Hossain, Project Director has contributed his best in many ways. Mrs. Riti Ibrahim Ahsan, Deputy Director and Mr. A.K.M. Abdus Salam, Statistical Officer of BBS and Child Nutrition Survey Co-ordinators supervised the training, data collection, tabulation plan and were responsible for finalization of this report.

The support of UNICEF, Dhaka is also greatly appreciated. The dedication of the Child Nutrition Survey Supervisors and Enumerators deserves special attention. Their hard work and attention to detail under demanding circumstances has been commendable. This is the only BBS survey where female enumerators resided in the rural areas during data collection.

Finally, gratitude is expressed to the many mothers who welcomed our enumerators into their homes and allowed their children to be weighed and measured.

A. Salam

(Abdus Salam)
Secretary
Statistics Division
and
Director-General
Bangladesh Bureau of Statistics
Ministry of Planning.

Dhaka, March 30, 1991

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SUMMARY

Bangladesh Bureau of Statistics (BBS) conducted its first child nutritional status module in conjunction with the Household Expenditure Survey (HES) in 1985-86. The results were published in 1987.

In response to national and international demand, BBS agreed to undertake a continuous nutritional survey. The second child nutritional status survey was conducted in 1989-90, following the HES of 1988-89. Data was collected in four time periods in June'89, August'89, October '89 and finally January '90. Survey was conducted in 196 PSUs. Out of 3136 households 1555 households were interviewed. 257 households had survey children but could not be interviewed because they were sick, or was not at home, or refused to give measurement, or had died or the household members had moved to different area. Only one household refused to give measurement in 1989-90 survey, whereas, in 1985-86 the number was 7. In all 2356 children were surveyed.

The surveys provided for an anthropometric assessment of pre-school age children in urban and rural areas. The indicators of nutritional status were weight-for-age, weight-for-height, height-for-age and mid upper arm circumference.

01. All Z-score based indicators were found to be distributed normally with the sample mean more than one standard deviation below the NCHS mean. For example, the mean Z-scores for Height-for-age, Weight-for-age and Weight-for-height were -2.51, -2.38 and -1.17 respectively for the Bangladesh sample. Mean of the percent deviation from reference median were also below 100. Mean arm circumference of all children were found to be 13.8 cm.

02. The distribution patterns of the Z-scores and the percent deviation from the reference median vary significantly between urban and rural samples. Urban samples, in general, show higher means with slightly higher variability.

03. Using Z-score categories, 35.2 percent of all children were severely stunted (below -3 SD) and another 30.3 percent were moderately stunted (in between -2 and -3 SD). About two-thirds of all children were underweight and more than 14 percent were found to be wasted. Percent of reference median categories indicate prevalence rates of 50, 72 and 10 percent for stunting, underweight and wasting respectively. Gomez classification indicates that only 6.6 percent of children can be classified as "normal".

04. The age of the child appears to have a significant impact on prevalence of malnutrition. Malnutrition prevalence is lower for the age group 6-11 months relative to 12-23 month age bracket for all Z-score based indicators. However, prevalence of malnutrition consistently increases with age if arm circumference is used as the indicator. This implies that arm circumference may not be a good anthropometric measure for screening the malnourished children.

05. Children from rural areas show higher prevalence of malnutrition (underweight, stunting and wasting) than children in urban areas. The 1989-90 survey found no significant differences between male and female children in terms of malnutrition prevalence. Stunting rates show no systematic seasonal relationship. Only the prevalence of wasting show significant decline during January, a post-harvest month for rural Bangladesh.

06. About 20 percent of children in Bangladesh were severely underweight as well as severely stunted. About 40 percent of the children were severely underweight or severely stunted or both. About a tenth of all children were both wasted and stunted.

07. A comparison of the nutrition status indicated by the 1989-90 survey with the results of 1985-86 survey shows that the mean values of the anthropometric indicators for 1989-90 were higher than the 1985-86 values. The prevalence of stunting and underweight was also lower during 1989-90 compared to 1985-86 rates. Stunting declined from 68.7 percent in 1985-86 to 65.5 percent in 1989-90. Prevalence of underweight also declined from 71.5 percent to 66.5 percent. However, wasting rates remained more or less constant over this period.

08. Household income and expenditure per capita tend to reduce the prevalence of malnutrition among children. For income level of Tk. 2000 per capita or less, prevalence of severe stunting is about 50 percent. For households with per capita income of Tk. 10,000 or more, the malnutrition rate declines to 12.5 percent. Prevalence of severe stunting and underweight also declines with higher food expenditures per capita. However, the ratio of food to total expenditure shows a much stronger relationship with the prevalence rates. Higher medical expenditure is related to lower prevalence of malnutrition but percent of income spent on medical care show no relationship with prevalence rates.

09. Prevalence of malnutrition does not show a consistent trend either with the area of land owned or operated. As expected, prevalence rates improve with the cost of construction materials used. This is probably a reflection of the economic situation of the households rather than the quality of residential houses per-se.

10. In Bangladesh, more than 90 percent of households obtain drinking water from sources considered safe or clean. It is interesting to note that water quality, defined by source of drinking water, shows no significant impact on child nutrition status. A simple two-way cross tabulation also fails to indicate any relationship between type of toilet facility available for the household members and nutrition status of children.

11. In this survey, only 17 percent of mothers were found to be literate. Prevalence of severe malnutrition is lower for children with a literate mother or care-taker. Years of schooling of the mother also show strong positive impact on child nutrition. Graph 0.11 shows the relationship between mother's education and child nutrition status.

12. Breast-feeding is almost universal in Bangladesh. According to the present survey, 99.7 percent of all children were breast-fed. About a third of all children were being breast-fed at the time of the nutrition survey. The duration of breast-feeding, on the average, is quite long. Unfortunately, breast-feeding was not explicitly defined by the survey. About 46 percent of children not currently breast-fed, were breast-fed for more than two years. Duration of breast-feeding also does not show any systematic relationship with the prevalence of malnutrition, defined by all the three indicators used in this study, in a simple cross-tabulation.

13. The survey found that about 30 percent of mothers introduced solid food to children by age six months. In fact, about five percent of children get solid food as early as three months of age or less. Another 30 percent of children were introduced solid food after nine months. More than 80 percent of the children received rice based food as the first weaning food followed by wheat-based weaning food (used for about 8 percent of children). The prevalence of wasting is found to be slightly lower for children who received solid food at age 3 to 9 months. On the other hand, wasting rates were lowest for children who received the solid food after 12 months of age.

14. A quarter of all children had at least one attack of diarrhoea during the last three months. Prevalence of wasting was 22.6 percent for children who had diarrhoea in the last three months compared to only 12 percent for others. Prevalence of severe stunting and underweight were higher for children who had at least one attack of diarrhoea in the last three months. Only 8 percent of children was reported to have at least one diarrhoeal attack during the two weeks prior to the survey. Prevalence of diarrhoea during the last two weeks tends to increase the prevalence of all forms of severe malnutrition. About a quarter of all children had severe respiratory infections or fever during the two weeks previous to the survey and they also show higher prevalence of malnutrition (underweight, stunting and wasting).

15. In rural areas, almost all briths were attended by relatives or non-trained mid-wives. In urban areas, slightly less than a quarter of all births were attended by trained mid-wives or professional nurses and doctors.

16. In the multivariate analysis, income or expenditure per capita was found to be an important determinant of nutrition status of children. After controlling for the income of the household, mother's educational status and type of toilet facility remains significant in explaining the prevalence of malnutrition among children. Water quality, defined by the source of water, show no significant impact on nutrition status. It appears that the optimal duration of breast-feeding is in between 6 to 12 months. However, duration of breast-feeding was not clearly defined in the survey.

Table 1

Stunting by area, sex and year

	National				Urban				Rural			
	1985-86		1989-90		1985-86		1989-90		1985-86		1989-90	
SEX	Weighted %	Actual No.	Weighted %	Actual No.	Weighted (%)	Actual No.	Weighted %	Actual No.	Weighted %	Actual No.	Weighted %	Actual No.
1	2	3	4	5	6	7	8	9	10	11	12	13
Both sex	56.1	1702	51.1	1145	44.2	624	42.3	356	57.6	1078	52.2	789
Male	54.8	871	50.8	599	42.4	304	42.5	193	56.3	567	52.1	406
Female	57.6	831	51.3	546	46.1	320	42.0	163	59.1	511	52.3	383

Table 2

Wasting by area, sex and year

	National				Urban				Rural			
	1985-86		1989-90		1985-86		1989-90		1985-86		1989-90	
SEX	Weighted %	Actual No.	Weighted %	Actual No.	Weighted %	Actual No.	Weighted %	Actual No.	Weighted %	Actual No.	Weighted %	Actual No.
1	2	3	4	5	6	7	8	9	10	11	12	13
Both sex	8.1	251	8.6	194	6.9	97	7.3	62	8.2	154	8.8	132
Male	6.8	117	8.1	95	6.7	48	7.0	32	6.8	69	8.2	63
Female	9.5	134	9.2	99	7.1	49	7.6	30	9.8	85	9.4	69

Table 3A

Prevalence of wasting by area and time period (both sexes), 1989-90

Time period	National		Urban		Rural	
	Weighted Percent	Actual No.	Weighted Percent	Actual No.	Weighted Percent	Actual No.
All period	8.6	194	7.3	62	8.8	132
1. June 1989	13.0	85	10.7	25	13.3	60
2. August 1989	7.9	41	6.0	14	8.3	27
3. October 1989	8.0	44	7.0	16	8.2	28
4. January 1990	4.5	24	4.6	7	4.5	17

Table 3B

Prevalence of wasting by area and time period (both sexes), 1985-86

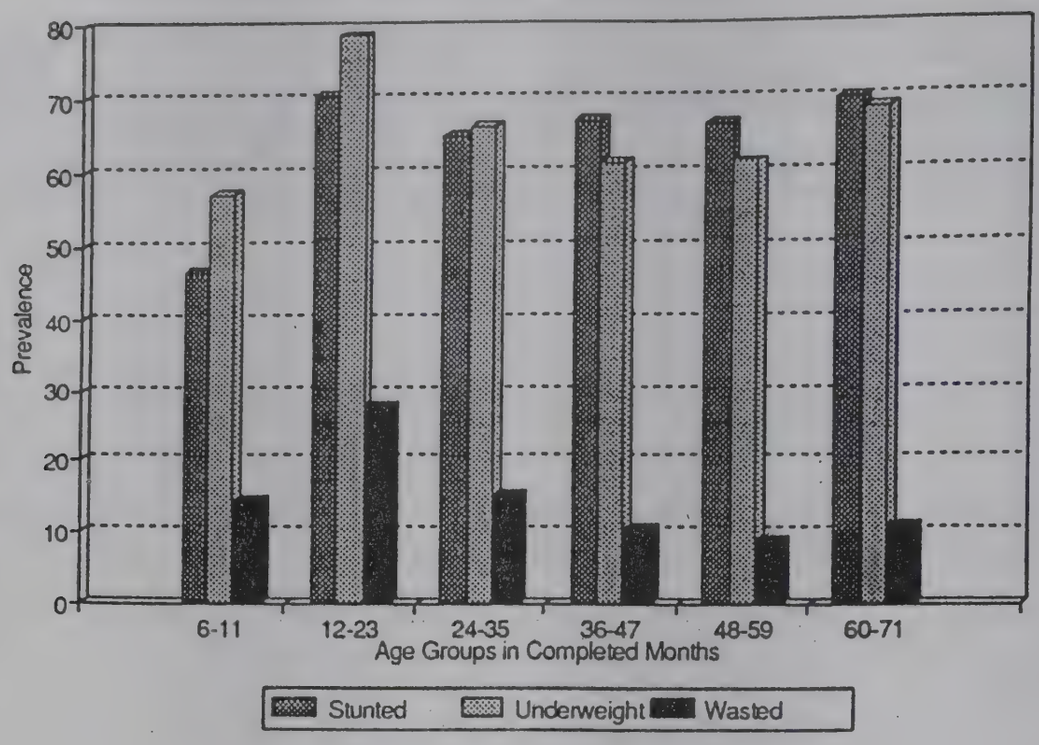
Time period	National		Urban		Rural	
	Weighted Percent	Actual No.	Weighted Percent	Actual No.	Weighted Percent	Actual No.
All period	8.1	251	6.9	97	8.2	154
1. September-October, 1985	9.4	81	9.2	36	9.5	45
2. January-February, 1986	4.0	29	3.4	11	4.1	18
3. April, 1986	8.7	61	5.2	18	9.1	43
4. July, 1986	9.9	80	9.1	32	10.0	48

Table 4

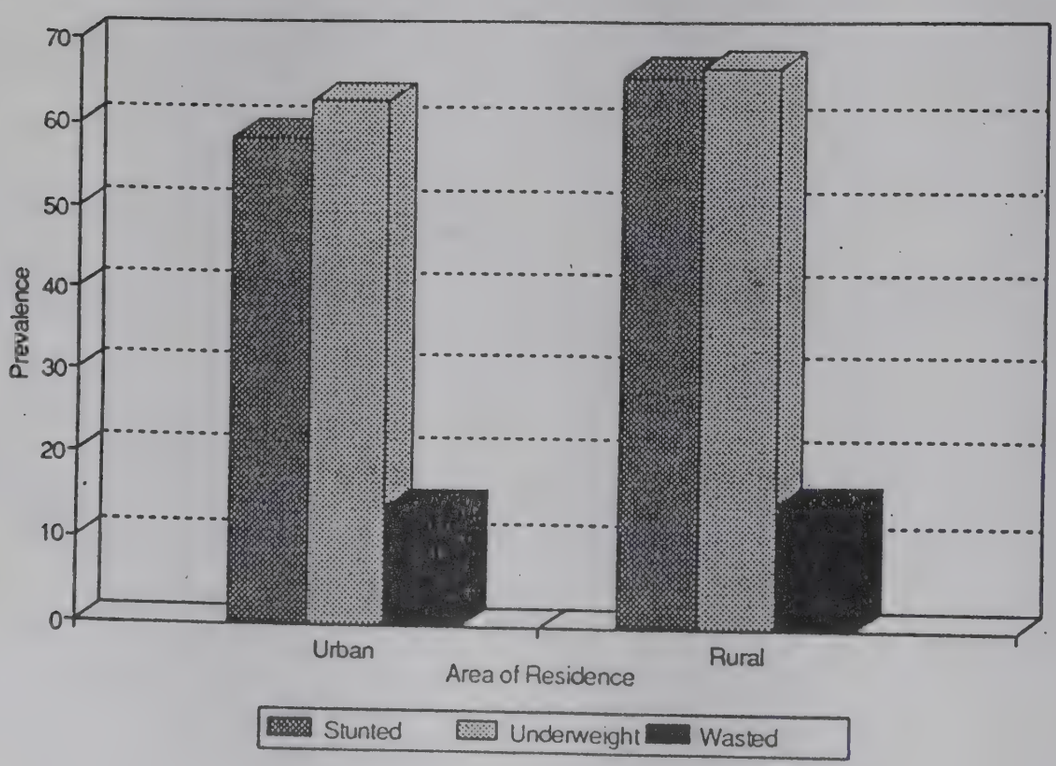
Low mid upper arm circumference by area, sex and year.

SEX	National				Urban				Rural			
	1985-86		1989-90		1985-86		1989-90		1985-86		1989-90	
	Weighted %	Actual No.	Weighted %	Actual No.	Weighted (%)	Actual No.	Weighted %	Actual No.	Weighted %	Actual No.	Weighted %	Actual No.
1	2	3	4	5	6	7	8	9	10	11	12	13
Both sex	14.4	301	10.7	171	9.9	100	8.5	51	14.9	201	11.0	120
Male	11.5	126	7.7	67	8.1	41	7.3	23	11.9	85	7.7	44
Female	17.6	175	14.0	104	11.8	59	9.8	28	18.4	116	14.5	76

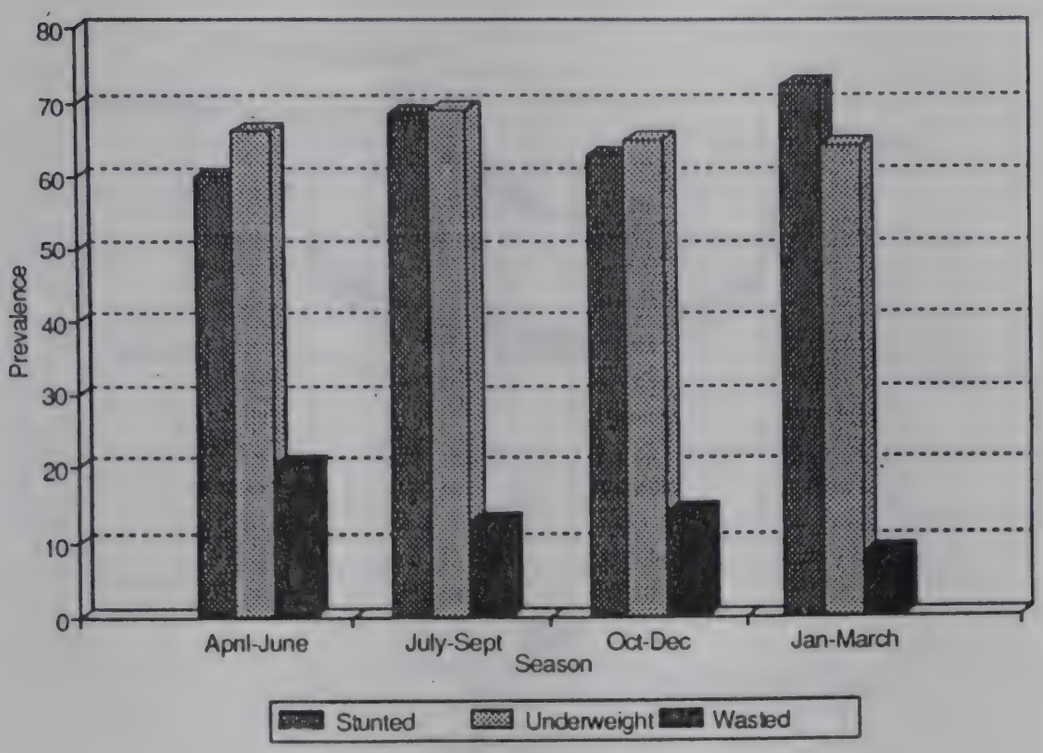
Graph 0.1 Prevalence of Stunting, Underweight and Wasting by Age Groups



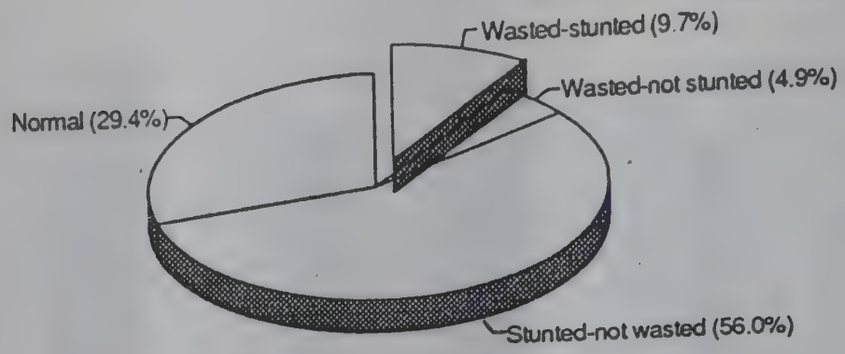
Graph 0.2 Prevalence of Stunting, Underweight and Wasting by Residence

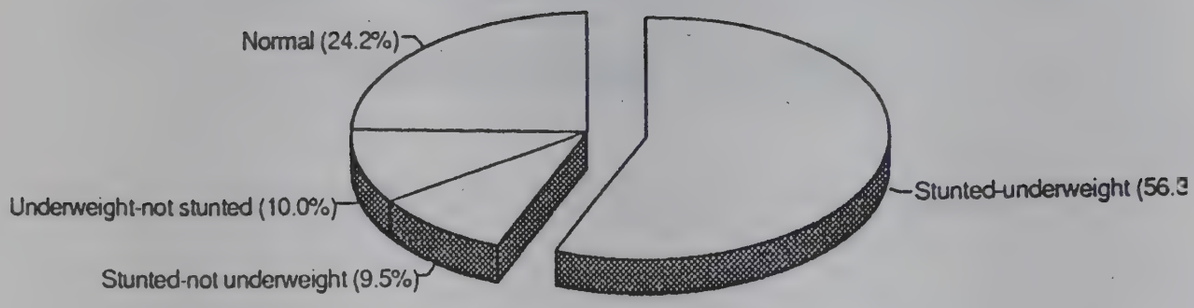


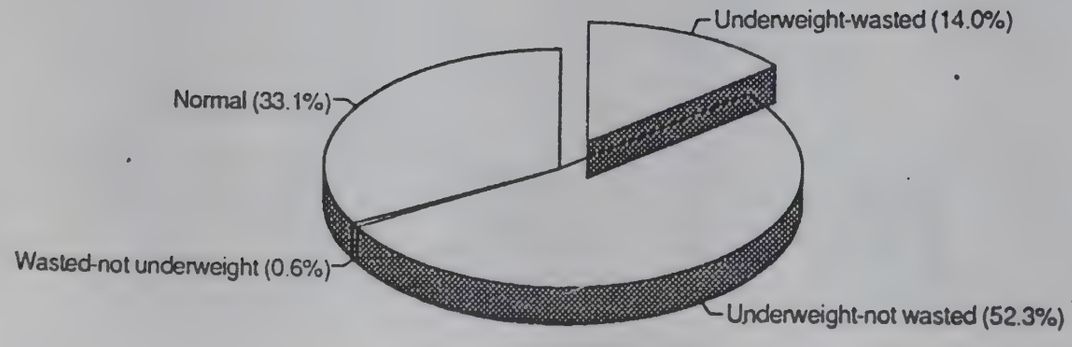
Graph 0.3 Prevalence of Stunting, Underweight and Wasting by Season



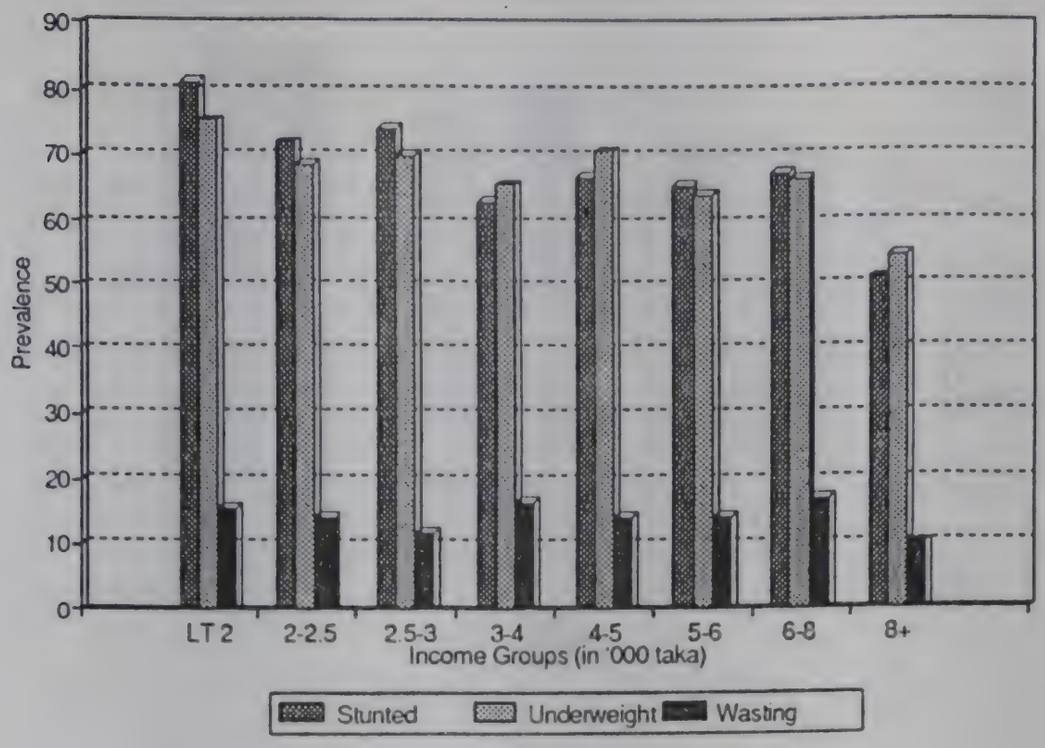
Graph 0.4 Prevalence of Stunting, Underweight and Wasting Combinations



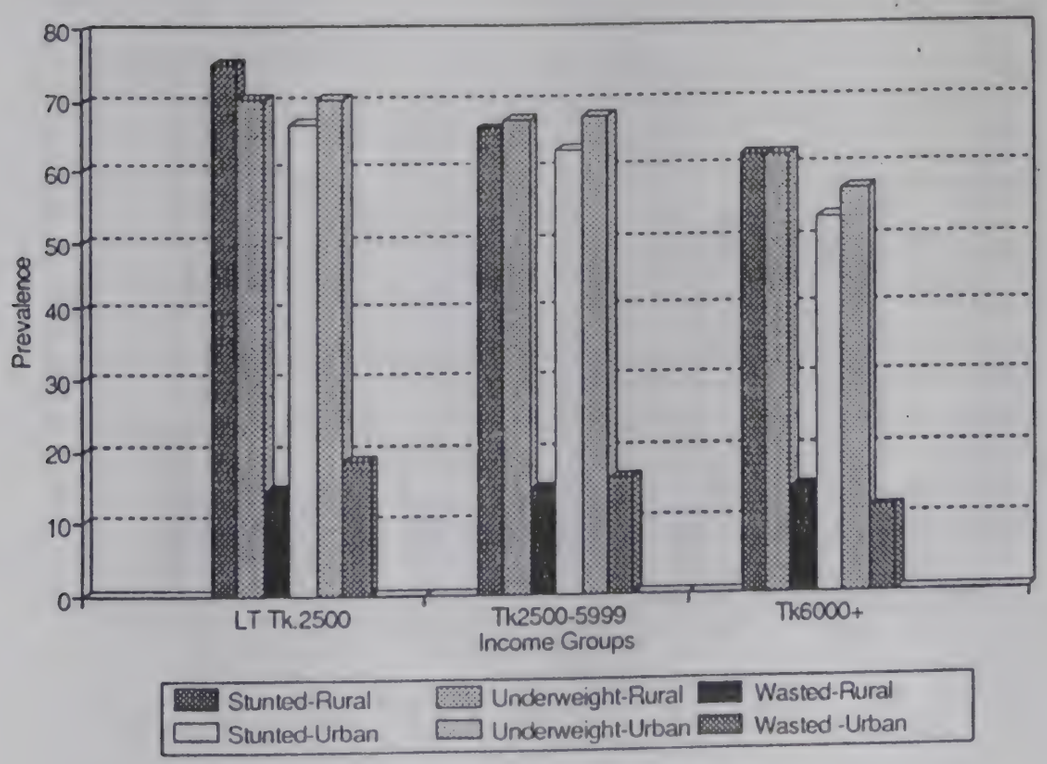




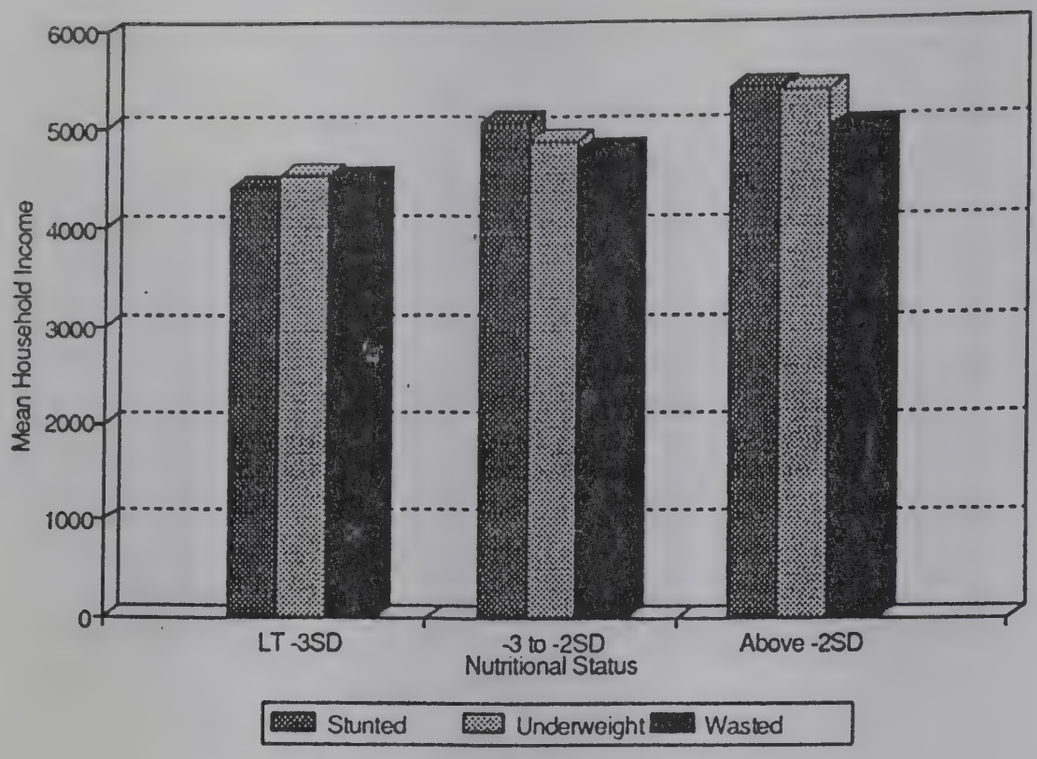
Graph 0.5 Prevalence of Stunting, Underweight & Wasting by Income Group



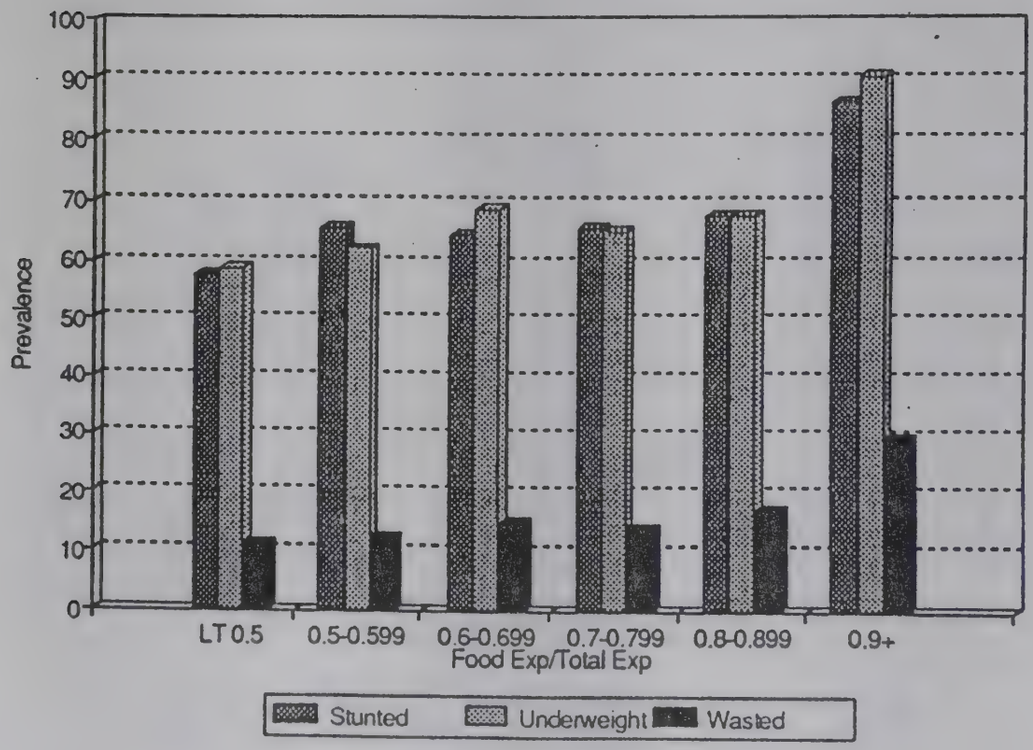
Graph 0.6 Prevalence of Stunting, Underweight & Wasting by Residence



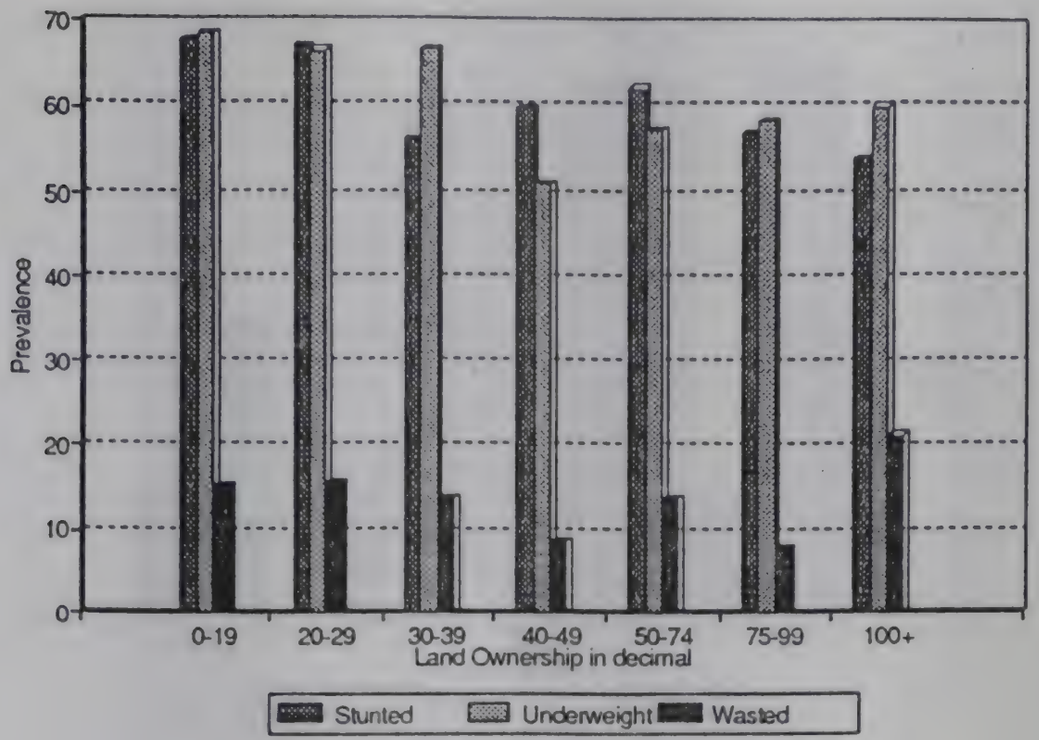
Graph 0.7 Mean Household Income per Capita by Nutritional Status



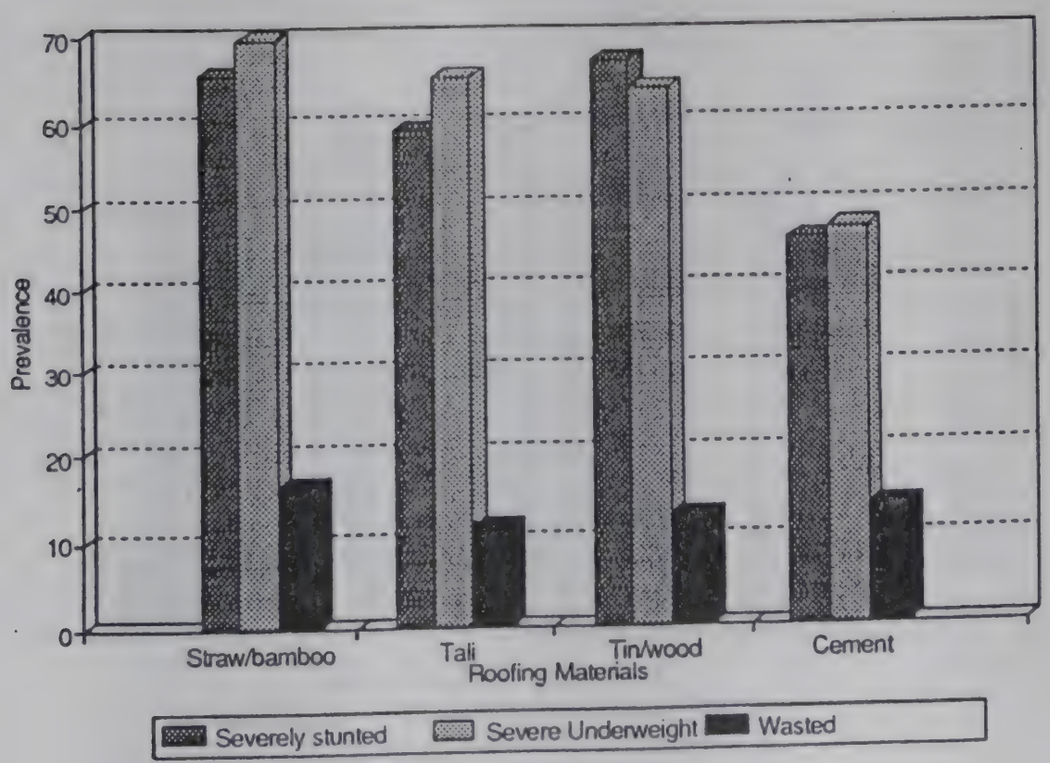
Graph 0.8 Food Expenditure Ratio and Prevalence of Malnutrition



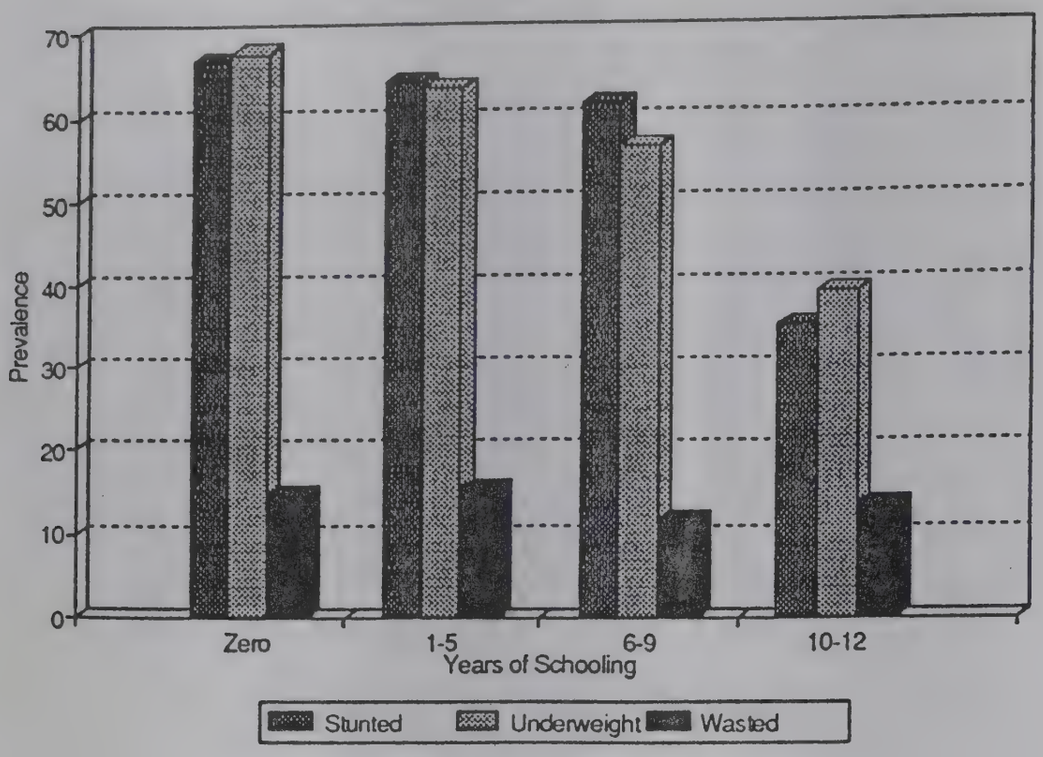
Graph 0.9 Land Ownership per Capita and Prevalence of Malnutrition



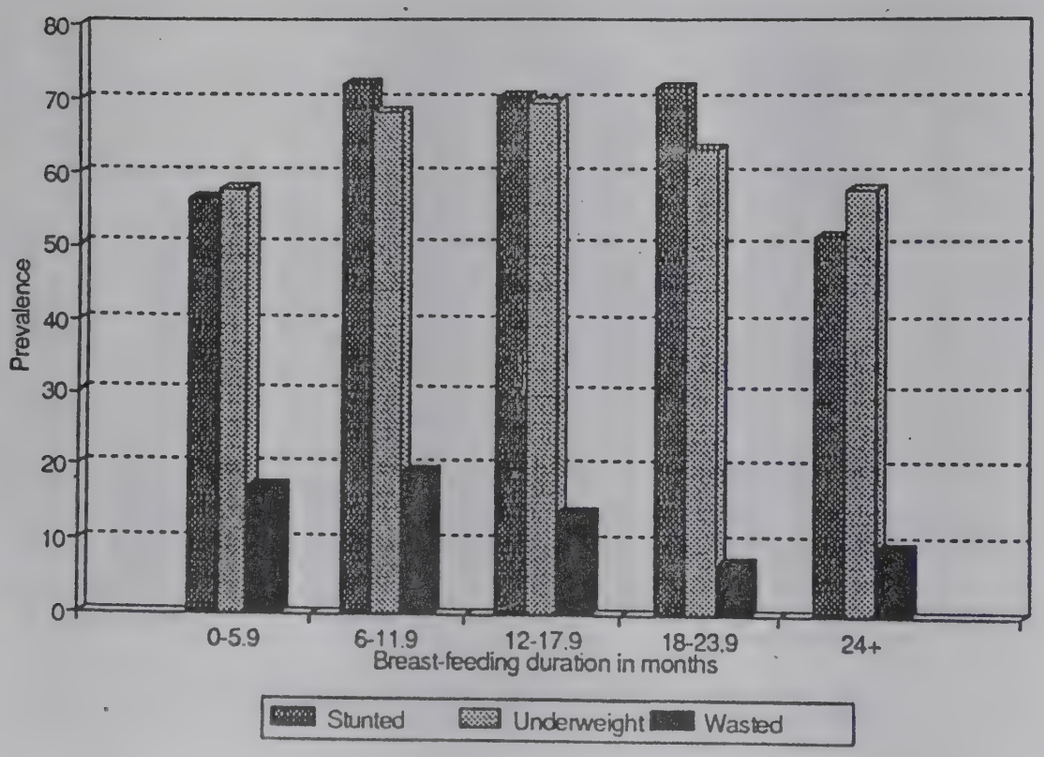
Graph 0.10 Roofing Materials Used and Prevalence of Malnutrition



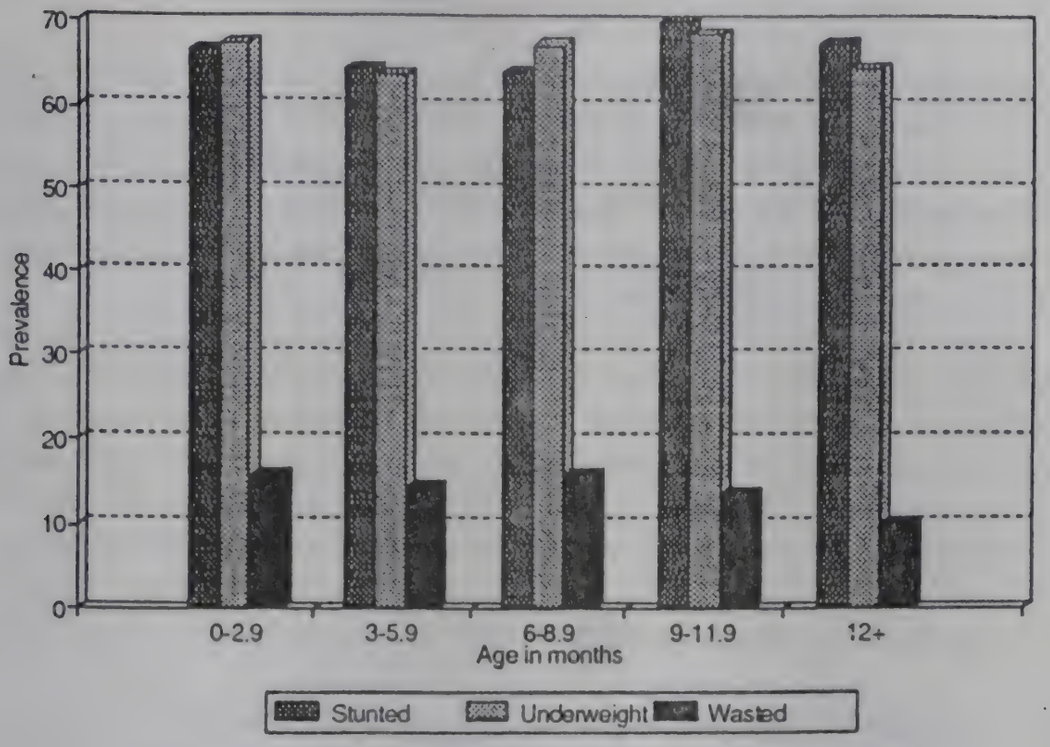
Graph 0.11 Mother's Educational Status and Prevalence of Malnutrition



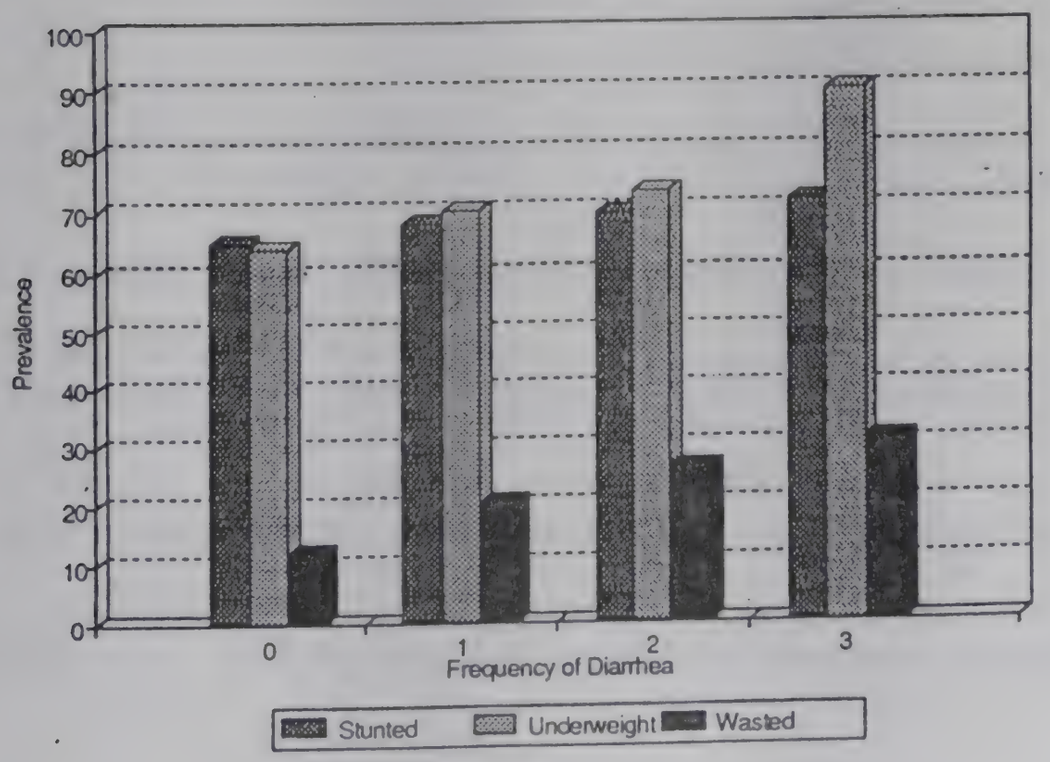
Grpah 0.12 Duration of Breast-feeding and Prevalence of Malnutrition



Graph 0.13 Age at First Introduction of Solid Food & Prevalence of Malnutrition



Graph 0.14 Frequency of Diarrhea During Last 3 mo. & Prevalence of Malnutrition



SECTION 2

INTRODUCTION

The Bangladesh Bureau of Statistics (BBS) implemented a child nutritional assessment module with the Household Expenditure Survey in 1985-86. The present survey, the 1989-90 Nutrition Module, is the second nutrition survey carried out by the BBS. The BBS planned to collect the data during 1988-89 but the survey was delayed due to flood conditions in the country. Both the 1985-86 and 1989-90 surveys are designed to produce national level statistics on nutrition situation of children. Since, the data were collected over a period of one year, season specific nutrition status can also be estimated.

The Nutrition survey of the BBS collects nutrition data from households surveyed by the Expenditure Survey. This allows matching nutrition data with HES data for each of the nutrition survey households. The potential benefits of integrating the nutrition survey with the HES are many. First, this process will generate a time series of national level cross-sectional surveys of child nutrition and household economic situation. Second, the household level matching of the data sets will be extremely useful to understand the determinants of nutrition status and to identify wider policy alternatives. Moreover, since the nutrition module uses the HES data collection infrastructure, the additional cost of incorporating the module is relatively low.

The purpose of this report is to present the results of the 1989-90 Nutrition survey and to compare them with the 1985-86 results. The 1985-86 data were reanalyzed to ensure consistency in presentation of the results and analytical methods followed. This report also presents a multivariate analysis to identify some important determinants of child nutrition status.

2.1 Objectives of the survey

The objectives of the Child Nutrition Survey are:

1. To describe the nutrition situation of children of age 6 to 71 months by different age categories, sex, area of residence, and seasons.

2. To generate a consistent, national level time series of nutrition status of children in Bangladesh.

3. To know the nature and pattern of household level health practices, sanitation, water supply and education related variables and their possible impacts on nutrition status of children.

4. To know the prevalence of childhood diseases, nature and pattern of breast-feeding and weaning food practices and other child specific variables and their impact on nutrition status of children.

5. To allow integration of the nutrition module data with the Household Expenditure Survey data to examine the importance of various socio-economic variables on nutrition status of children.

SECTION 3

SURVEY METHODOLOGY

3.1 Sample design

The "Integrated Multipurpose Sample (IMPS)" has been used by BBS for four surveys: the Household Expenditure Survey (HES), Labour Force Survey, Demographic Survey, and the Child Nutritional Status Survey, which was however, carried out as a component of the HES, 1988-89.

Entire Bangladesh, excluding Chittagong H.T., Khagrachari, Bandarban, constituted the universe for the sample. Two stage stratified sampling was used to select the sample. At the first stage, 360 Mauza or Mahallah Primary Sampling Units (PSU) have been selected from the universe. Out of 360 PSUs, 120 were located in urban areas and remaining 240 in rural areas. Sixteen households were selected randomly from each of the PSUs for the Household Expenditure Survey of 1988-89. Child Nutrition Module of 1989-90 is based on a sub-sample of about 50 percent of 1988-89 HES. At least two PSU was taken from each sub-strata. Out of 360 PSUs instead of 180 PSUs, 196 PSUs were selected by NS. A sample of 45 to 52 PSUs were drawn randomly in each quarter from the list of HES PSUs. Out of 196 PSUs 77 were urban and 119 were rural.

The following weights, which were adjusted for the non-response, were applied to produce population proportionate sample (see Appendix B).

Area	Bangladesh			
	Dhaka Division	Chittagong Division	Rajshahi Division	Khulna Division
Urban	2556	2382	2010	2069
Rural	9665	10246	9366	11731

A detailed description of the IMPS appears in Appendix C.

3.2 Coverage

Table 5 present the number of PSU, households, and children enumerated by time period. Nutrition Survey teams identified if a 6-71 month old child was available for weighing and measuring, and if a parent/guardian was available to interview.

Mean coverage rate was 85.8% (varying from 90.0% to 82.3%). Non-response rate was 14.2% (varying from 10.0% to 17.7%). Non-response rate was 7.7% during 1985-86 survey. Due to flood situations, the data collection of the nutrition survey was delayed and same of the households were visited almost one year after the HES visit. Due to flood damage more households were found transferred than 1985-86. There was only one case of refusal during 1989-90 compared to 7 in 1985-86.

Table 5

Number of primary sampling units, households, and children enumerated by time period.

Data collection time period	Number of Primary Sampling Units			Number of Households				Coverage percent (Col. 7/ Col.5)	Non-response (100-col. 8)	Number of Households not interviewed						Number of children measured
	Total	Urban	Rural	Total	Having survey child (6-71m)	Having no survey child	Inter-viewed			Total (col. 5/ col. 7)	Child not at home	Trans-ferred	Illness	Refusal	Death	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1st period (June,1989)	52	20	32	832	492	340	443	90.0%	10.0	49	32	11	2	1	3	690
2nd period (August '89)	46	20	26	736	405	331	359	88.6%	11.4	46	32	12	1	-	1	548
3rd period (October '89)	49	20	29	784	458	326	377	82.3%	17.7	81	43	34	1	-	3	577
4th period (January '90)	49	17	32	784	457	327	376	82.3%	17.7	81	57	20	2	-	2	541
All period	196	77	119	3136	1812	1324	1555	85.8%	14.2	257	164	77	6	1	9	2356

* Household interviewed: Where at least one child (6-71 m) was weighed and measured.

3.3 Enumerator selection and training

Enumerator training took place before each of the data collection periods as follows:

Training period

1. May 14 - 18, 1989
2. July 27-August 1, 1989
3. September 28-October 1, 1989
4. January 2-4, 1990

Eighteen enumerators (12 females and 6 males), most of whom had graduate and post graduate degrees, were selected from the permanent staff of BBS and were trained for data collection. Out of 18 enumerators 14 worked in 1985-86 survey.

Training was held from 10.00 A.M. to 3.00 PM daily, having a lunch break for an hour. Training on filling up questionnaire form, which included practicing completing the questionnaire, role playing and age assessment, took place at the BBS. For the anthropometric measurement training children used were brought by the enumerators and the training was held at the BBS too. Enumerators practiced each type of measurements i.e. height, length, weight and arm circumference for hours, after which a standardization test was administered to test enumerator competence.

A one day field trial was held in Sonargaon. Practice of enumeration of the entire questionnaire, including nutritional status measurements were closely supervised.

Teams were formed based on both standardization test results and subject evaluations of all trainees. Fifteen enumerators were selected to form five teams consisting of two females and one male per team.

3.4 Data collection

Nutritional status assessment data were collected through a structured questionnaire developed by the planning committee of this survey (appendix I). Before finalizing the questionnaire, field trials had been conducted both in urban and rural area. The english version of the questionnaire may be seen in appendix H. Lists of 16 households for each PSU's for each data collection period were obtained from the HES unit and made available to the survey teams. Each team completed approximately 10 PSUs in each data collection period. Four Nutrition Survey Administrators i.e. one Statistical Officer and three Assistant Statistical Officers were responsible for the supervision of the field work. Nutrition Survey teams visited the same households at different times shown below:

HES data collection time period	NS data collection time period
January-March, 1989	June 1989 (first Qtr.)
April-June, 1989	August, 1989 (second Qtr.)
Nov.'88-Jan.'89 (Due in July-Sept.,1988)	October, 1989 (third Qtr.)
Nov.'88-Jan.'89 (Due in Oct.-Dec.,1988)	January, 1990 (fourth Qtr.)

3.5 Data processing

Data editing was done at three different stages:

Field Editing: The survey teams checked completed questionnaires at the end of each household interview, at the end of the day and before departing from the PSU.

At BBS: At the end of the data collection of each period, questionnaires were checked by enumerators and the four survey administrators. Finally a random checking was done by the survey co-ordinators, enumerators were questioned on difficulty of obtaining information on any particular variable.

Computer Editing: Data were edited and cleaned and any consistencies or missing values were identified.

Results of seven variables were transcribed from the HES questionnaires on to the nutrition questionnaires at the end of each data collection period. The BBS IBM 5280 (micro computer) was used for data entry; the IBM 4341 mainframe mainframe was used for the edit program, tabulation, and data analysis. Cobol, Fortran and Cents 4 were used to write programs for data tabulations. The US National Center for Health Statistics (NCHS) reference standards for child growth were entered into the BBS system for comparing survey data. Cross tabulations were created from the data where the unit of analysis was the survey child.

All the tabulations and other statistical analyses presented in Z-score in this report were produced by using the SPSSPC package program in an IBM PC with 40 MB hard disk.

SECTION 4

NUTRITION ASSESSMENT METHODS

4.1 Anthropometry in nutrition assessment

Malnutrition of children can be assessed using many different methods: clinical, dietary, biochemical or anthropometric. Due to relatively more expensive procedures involved with clinical and biochemical methods, anthropometry is often preferred in less developed societies.

Although the anthropometric method is easier to use, it requires only simple measurement tools, and relatively less expensive to implement than other methods available, it is not necessarily less sensitive and specific in identifying nutritional problems among children compared to clinical and biochemical methods. In fact, clinical and biochemical methods often fail to identify mild and moderate forms of Protein Energy Malnutrition (PEM). Anthropometry appears to be a better indicator of moderate to severe PEM, the most important form of malnutrition in less developed societies.

If the intake of major nutrients is slightly lower than the required level, children often make adjustments in physical activity and in most cases, this deficiency will have no impact on anthropometry, clinical or biochemical measures of malnutrition. Only a detail dietary survey of individuals can indicate this lower consumption of nutrients. In this sense, anthropometric indicators as well as clinical and biochemical indicators of malnutrition cannot identify all types of nutrition stress.

4.2 Anthropometric indicators

For the analysis of nutrition status of children, it is important to distinguish between deficits in weight-for-height and in height-for-age. This is because these two types of deficits represent different processes of malnutrition. The terms "wasting" and "stunting" are used to describe these two types of deficits. It is also important to estimate indicators based on weight and age. However, weight-for-age indicators are basically a nonlinear combination of the other two types of anthropometric indicators.

Wasting indicates a deficit in tissue and fat mass compared with the amount expected in a child of same height or length. This may occur either due to growth failure or loss of weight of a child. Stunting indicates reduced skeletal growth compared to the length or height expected in a child of same age. Skeletal growth may slow down from birth but the slowing down of length may not be evident for some years.

There are some important differences between stunting and wasting. A child can fail to gain weight or can even lose weight but a child can fail to gain height but cannot lose it even under extreme nutrition stress situation. During the initial few years of life, the rate of weight gain is much higher than the rate of growth of height. Catch-up in height requires a much longer time period than catch-up in weight. All these differences should be considered when interpreting the anthropometric indicators based on weight and height. This implies that weight at a certain height should be a better indicator of current and acute malnutrition and height at a given age should reflect chronic malnutrition among children.

To be able to identify malnutrition from the anthropometric indicators, we need a "norm" to define the indicators for normal children. The reference or standard defines this norm to carry out the comparisons for the surveyed children. The standard is basically a normative measure, a value judgement. However, definition of a norm is a necessary step in the process of identification of children likely to be suffering from PEM. Presently, the NCHS reference is widely used as an international standard to estimate the prevalence of malnutrition in a society.

4.3 Defining nutrition status by Anthropometric indicators

In the analysis of the data, one can try to explain the whole distribution or to estimate the percent of a population outside the reference distribution. There are three different ways of analyzing the data within the two general approaches mentioned above. The observed measurements can be related to the reference by the percentile position, as a standard deviation score (Z-score) or as a percent of reference median.

To describe the whole distribution, one can draw the cumulative distribution function compared to the cumulative for the reference population. Simple frequency distribution functions can also be compared. To estimate the proportion outside the reference distribution, we need to define a cut-off point. For example, below the third centile, Z-scores less than negative 2SD or weight-for-height below 80 percent of median are some widely used cut-off levels.

The definitions of nutritional status using different cut-off points are listed below :

Height-for-Age or stunting : Children with a height-for-age of less than 90 percent of the reference median are classified as "stunted". If Z-scores are used to classify "stunting", children with height-for-age less than -3SD away from the median are classified as "severely stunted" while children with Z-scores in between -2 to -3SD are classified as "moderately stunted". Summation of these two categories of stunting defines total prevalence of stunting.

Weight-for-Height or Wasting : A child located below 80 percent of the reference median is classified as "wasted". Again, Z-score classification uses -2 and -3SD as the cut-off points to define moderate and severe forms of "wasting", respectively.

Weight-for-Age or underweight : As in the case of weight-for-height indicators, one can use 80 percent of reference median to classify underweight children. The Gomez classification also uses percent of reference median to classify children into four groups. The cutt-off points used by this classification are :

Normal	>= 90 percent of median
First degree	75 to 89.9 percent of median
Second degree	60 to 74.9 percent of median
Third degree	below 60 percent of reference median

Often the term "underweight" is used to describe this anthropometric indicator. Again -2SD and -3SD can be used as cut-off points for the Z-score method.

Middle Upper Arm Circumference (MUAC) : The 1985-86 report used 12.5 centimeter as the cut-off point to define malnourishment. MUAC less than 12.5 cm was defined as malnutrition and MUAC between 12.5 to 13.4 cm was defined as the borderline case. Unfortunately, there exists no internationally accepted cut-off point for MUAC. This report will follow the classification method used by the 1985-86 report. For the internaitonal sample, the MUAC does tend to increase with age and therefore measure prevalence of malnutrition by MUAC tend to increase with the age of the child.

4.4 Z-scores and rationale for using Z-score categories

Calculating Z-scores from observations is a simple process of comparing the height, weight and age with the reference statistics for similar age or height. Appendix G explains the method of calculating the Z-scores from observed age, weight and height of the children.

Defining nutrition status by Z-scores has some important advantages. For example, nutrition status defined by using percentile position fails to classify children falling below the third centile, unless a specific distribution function is assumed. The coefficient of variation of anthropometric measurements varies with age and deviation from median cannot take that into consideration. On the other hand, Z-scores, by construction, accounts for these age-dependant differences in variability. Therefore, Z-score cut-off points are preferred over the other two types of measures mentioned above.

Both the 1977 and 1986 reports of WHO Working Group on measuring nutritional status of children recommended the use of Z-scores. "For statistical reasons, measurements of a study population should be related to the reference population by standard deviation scores (Z-scores) rather than a percentage of the median of the reference, which has been the general practice" [WHO 1986, Waterlow 1977].

SECTION 5

SELECTED HES, HEALTH, WATER AND SANITATION VARIABLES

5.1. Selected health and sanitation variables

Selected variables, which may affect or are related to nutritional status were included in the questionnaire. These factors have been assessed so that observed variation in nutritional status can be better evaluated. These are the "explanatory" or "independent" variables of nutritional status and may help explain the observed variation in nutritional status. The following independent variables were analysed for this report:

a. Household size
b. Total number of children in the household
c. Household toilet facility
d. Household's children toilet facility
e. Maternal education level
f. Child birth date
g. Age of child when stopped breastfeeding
h. Child immunization
i. Diseases.

5.2. Selected HES variables

The following HES variables were selected for analysis and transcribed into the nutrition questionnaire :

a. Total annual household income
b. Total annual household expenditure
c. Total annual household expenditure on food
d. Total annual household expenditure on medical care
e. Occupation of the head of the household
f. Total land owned by the household

SECTION 6

RESULTS

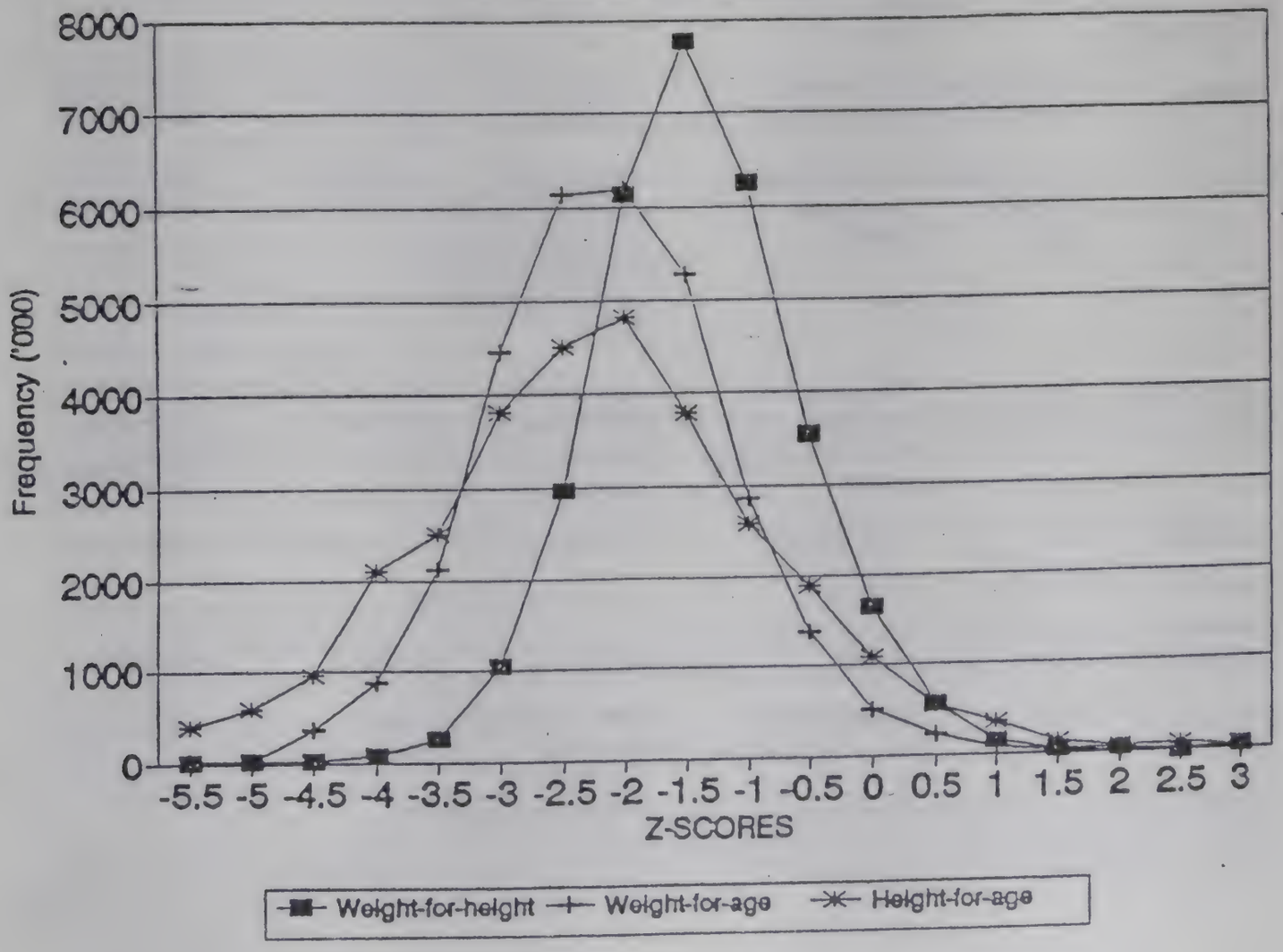
6.1 Characteristics of the nutrition survey sample

This survey collected data from 1555 households in Bangladesh. A total of 2356 children, belonging to the survey households, were measured. Out of the total children, 1231 were male, implying a sex ratio (male to female) of 1.095.

About 97 percent of the surveyed households are headed by male members. Although only three percent of households are headed by female, it is important to examine the nutrition status of children belonging to these households. Female headed households are often considered highly vulnerable to nutritional stress. As expected, more than 90 percent of surveyed households were Muslim and about 9 percent Hindu. Median size of the surveyed households was found to be at 5.8. The median household had 2.7 members below the age of 15 years.

The age distribution pattern, weighted by rural and urban weights, is found to be quite similar to the expected pattern derived from the demographic life table constructed for Bangladesh. Table 6 compares the age distribution pattern of children surveyed with the estimated age distribution pattern for Bangladesh using the 1987 Life Table (BBS 1989).

Graph 0.15 Distribution of Z-Scores for Children 6-71 months



6.2 National nutritional status results

Table 6

Comparison of Nutritional Status Results from Five Surveys

Indicator	INFS** 1981-82	BBS 1985-86	HKI *** 1982-83	HKI *** 1990(August)	BBS 1989-90
Stunting	57.3%	(Weighted) 56.1% (National) 57.6% (Rural) 44.2% (Urban)	- 42.0% (Rural)	49.5% (Both areas) 48.8% (Rural) 51.2% (Urban)	(Weighted) 51.1% (National) 52.2% (Rural) 42.3% (Urban)
Wasting	20.0%	(Weighted) 8.1% (National) 8.2% (Rural) 6.9% (Urban)	- 6.0% (Rural)	11.3% (Both areas) 10.9% (Rural) 12.1% (Urban)	(Weighted) 8.6% (National) 8.8% (Rural) 7.3% (Urban)
Mid-upper arm circumference (< 12.5 cm)	-	(Weighted) 14.4% (National) 14.9% (Rural) 9.9% (Urban)	10.0% (Rural)	13.4% (Both areas) 11.9% (Rural) 16.8% (Urban)	(Weighted) 10.7% (National) 11.0% (Rural) 8.5% (Urban)
Definitions of:					
Stunting	<90% median height for age	<90% median height for age	<90% median height for age	<90% median height for age	<90% median height for age
Wasting	<80% median weight for height	<80% median weight for height	<80% median weight for height; also-2 sd from median height for age & weight for height	<80% median weight for height	<80% median weight for height
Actual Sample size	510 cross-sectional	3283 urban and rural cross-sectional four data collection periods	Rural sub-set 2800 cross-sectional	1900 urban and* 4590 rural children	2356 urban and rural cross-sectional four data collection periods
Age range	0-59 months	6-71 months	3-71 months	6-59 months	6-71 months
Reference Standard used	Harvard	NCHS	NCHS	NCHS	NCHS
Population covered	Rural	Urban & Rural	Urban and Rural (Rural data shown above)	Urban Slum & Rural	Urban & Rural

* Urban areas include urban slums only and rural areas include disaster prone areas only.
** INFS : Institute of Nutrition & Food Science, Dhaka University.
*** HKI : Helen Keller International, Bangladesh.

Table 7

Age Distribution of Surveyed Children and Expected Age Distribution Pattern

Age Groups (in months)	Percent of children in the age group	
	1989/90 Survey	Estimated for Bangladesh
6-11	9.6	10.4
12-23	17.7	18.5
24-35	19.5	18.2
36-47	17.8	17.8
48-59	17.4	17.6
60-71	18.0	17.5

6.3 Child nutrition situation in Bangladesh, 1989-90

A. Distribution of the Anthropometric indicators.

In this report, six different measures of nutrition status are reported, three based on Z-scores and the other three based on percent of reference median. Specifically, following seven anthropometric indicators are calculated to estimate child nutrition status in Bangladesh:

Height-for-age Z-scores (HFAZ)
Weight-for-age Z-scores (WFAZ)

Weight-for-height Z-scores (WFHZ)

Percent of reference median height-for-age (MHFA)

Percent of reference median weight-for-age (MWFA)

Percent of reference median weight-for-height (MWFH)

Mid-upper arm circumference (MUAC)

Graph 0.15 shows the distribution of Z-scores for the sample. All three Z-score based indicators appear to be distributed normally with the mean values located to the left of the NCHS mean. Height-for-age Z-scores have relatively wider distribution around the mean (higher standard deviation) compared to the distribution of the other two indicators. Weight-for-height Z-scores show a high concentration around the mean compared to other two indicators.

Table 8 reports the mean, standard deviation and skewness of these indicators for the surveyed children during 1989-90. Mean of HFAZ and WFAZ are found to be less than -2.00 SD with high standard deviations. Therefore, the "average" child in Bangladesh is more than two standard deviation below the reference mean. For WFHZ, the mean is found to be -1.17. For HFAZ and WFAZ skewness is close to zero implying that the distribution of these scores are not skewed. The indicators WFHZ, MWFA and MWFH show low degree of skewness.

Table 9 reports the mean and standard deviation of the distributions by region. The mean levels for rural areas are lower than for urban areas for almost all nutrition indicators listed.

For HFAZ and WFAZ, the mean values for urban areas are more than 0.15 SD above the rural mean values. For WFHZ, rural and urban mean values are almost identical. For the percent of median indicators too, rural mean were lower than the mean found for urban areas.

A test of differences of the mean values between urban and rural samples indicate that the mean values are significantly different for all four height-for-age and weight-for-age indicators. Mean values of weight-for-height indicators are not significantly different for rural and urban areas.

Table 8

Mean, Standard Deviation and Skewness of Anthropometric Indicators

Anthropometric Indicators	Mean	S. Dev.	Skewn.
HFAZ	-2.51	1.52	0.44
WFAZ	-2.38	1.02	-1.06
WFHZ	-1.17	0.95	-0.03
MHFA	89.51	6.04	-0.33
MWFA	73.85	10.90	1.09
MWFH	89.05	8.49	0.70
MUAC	13.84	1.19	-0.21

Table 9

Mean and Standard Deviation of the Anthropometric Indicators by Area of Residence

Anthropometric Indicators	Rural		Urban	
	Mean	S. Dev.	Mean	S. Dev.
HFAZ	-2.54	1.52	-2.29	1.46
WFAZ	-2.39	0.96	-2.25	0.99
WFHZ	-1.17	0.87	-1.17	0.85
MHFA	89.40	6.05	90.36	5.83
MWFA	73.67	10.92	75.26	10.69
MWFH	89.04	8.37	89.11	7.87
MUAC	13.05	1.44	14.75	1.20

B. Prevalence of severe and moderate malnutrition:

Tables 10-14 report the distribution of surveyed children among different categories of Z-scores and percent of reference median by age groups, sex, area of residence and seasons. Prevalence of severe and moderate forms of malnutrition can also be read directly from the tables. Tables for children of age 6 to 59 months are included in Appendix F.

(a) All children

If height-for-age Z-scores are used, 35.2 percent of all children were severely malnourished in Bangladesh during 1989. Another 30.3 percent were moderately malnourished. Therefore, the prevalence of low height-for-age, or stunting during 1989-90 was 65.5 percent.

The prevalence of low weight-for-age Z-scores was 66.5 percent in 1989. Out of this total prevalence of low weight for age, about 26 percent can be categorized as severely underweight.

In Bangladesh, prevalence of wasting, measured by less than -2 Z- scores, was 14.7 percent during the survey period. Only 1.6 percent children were found to be severely wasted.

Using percent of reference median cut-off points, 49.6 percent of all surveyed children were below 90 percent of the median height for age. More than 72 and 9 percent children were below 80 percent of weight-for-age and weight-for-height reference median respectively.

Using Gomez classification (weight for age), 6.8 percent suffered from third degree malnutrition. Another 47 percent can be categorized as suffering from second degree malnutrition while only 6.6 percent can be considered "normal" in terms of their nutrition status.

(b) Age of children and prevalence of malnutrition

Prevalence of malnutrition is found to be much lower for the age category 6 to 11 months than for other age groups. Graph 0.16 plots the prevalence of severe and moderate malnutrition using the Z-score categories and MUAC. For height-for-age, prevalence rates were found to be lower for children of age 6-11 months compared to the rates for children in the age group 12-23 moths. For other age categories, prevalence rates remain more or less stable. Weight-for-age indicator shows that the prevalence of malnutrition is highest for the the age group 12-23 months. Beyond 24 month age, prevalence of underweight tends to decline. Moderate and severe forms of wasting also show a similar pattern; an increase for the age group 12-23 months compared to the rate for 6-11 months. Children older than 24 months show relatively lower rate of wasting than the age category 12-23 months.

(c) Area of residence

Prevalence of malnutrition is higher in rural areas than in urban areas for all three indicators(stunting, wasting and underweight). Prevalence of stunting in urban and rural areas of Bangladesh are 58.3 and 66.7 percent respectively. Most of this regional differences is due to the higher prevalence of severe stunting in rural area (36.4 percent for rural areas compared to 28.5 percent for urban areas). Prevalence of underweight and wasting are also higher for rural areas.

Graph 0.16 : Prevalence of Malnutrition
by Age Categories

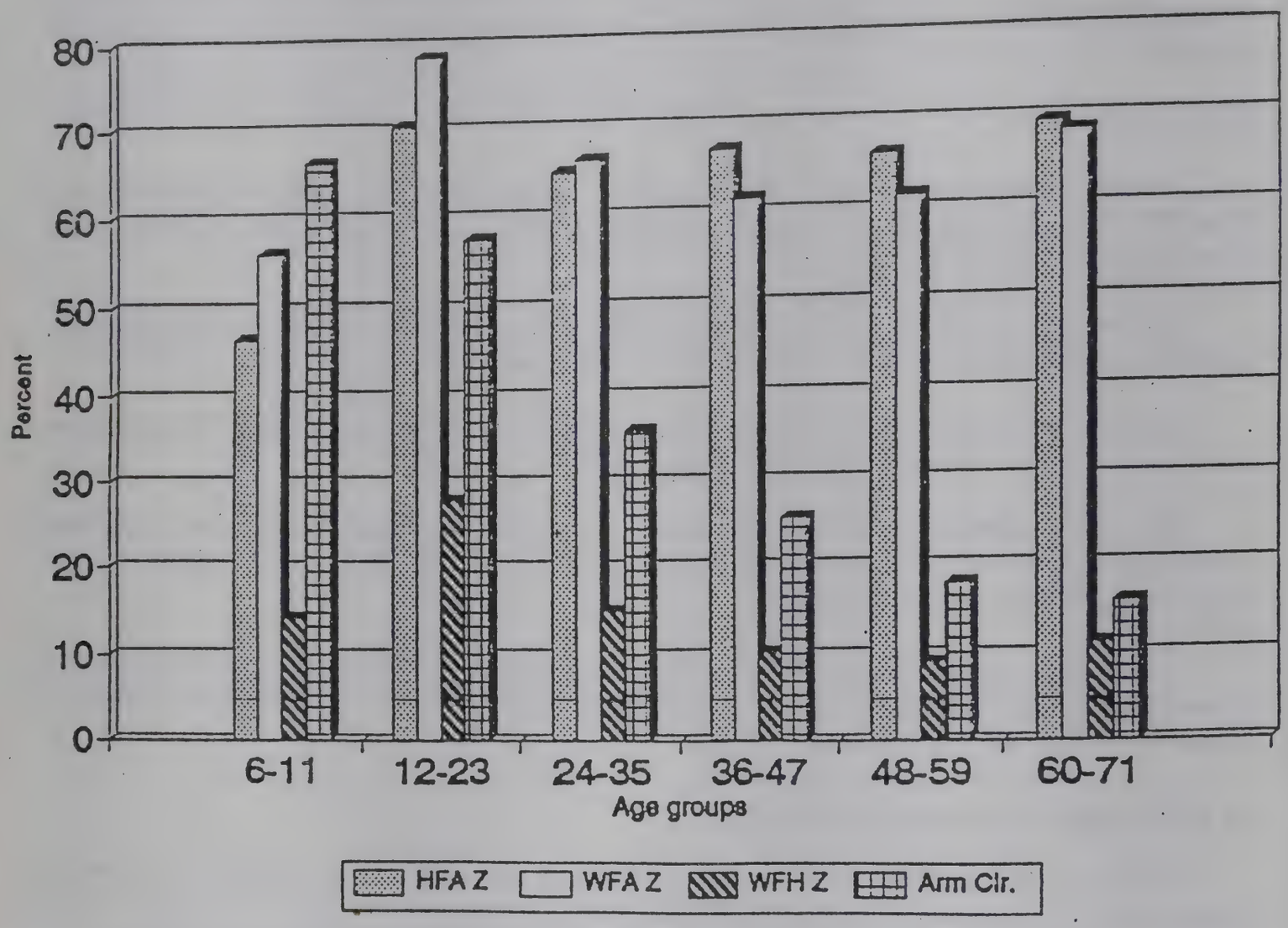


Table 10

Percent Distribution of Children age 6-71 months by HEIGHT FOR AGE Standard Deviation Category Using NCHS Reference Population (1989-90 Nutrition Module of Bangladesh)

Variable	Z-score Categories (Standard Deviations from the Median of the NCHS Reference Population)						
	-3.00 or Less	-2.99 to -2.00	-1.99 to -1.00	-0.99 to +0.99	1.00 to 1.99	+2.00 +more	Total
Age in completed months							
6-11(219)	14.8	31.7	34.3	15.7	0.5	3.1	9.6
12-23(407)	41.2	29.3	19.6	8.6	0.5	0.8	17.7
24-35(453)	33.8	31.1	17.3	15.3	1.7	0.7	19.6
36-47(418)	40.1	27.2	18.4	14.0	0.5		17.7
48-59(417)	36.3	30.3	19.4	14.3			17.5
60-71(442)	37.7	32.2	21.3	8.6	0.3		18.2
Area of Residence							
Urban(843)	28.5	29.8	24.6	15.5	1.2	0.2	11.5
Rural(1513)	36.4	30.3	20.1	12.1	0.5	0.6	88.5
Sex							
Male(1240)	34.6	31.0	20.8	12.5	0.5	0.6	52.0
Fem.(1116)	36.5	29.4	20.4	12.4	0.7	0.5	48.0
Season							
April-June 1989(690)	29.7	30.1	22.7	15.9	0.5	1.0	27.6
July-Sept 1989(548)	37.3	31.5	18.8	11.8	0.4	0.3	28.6
Oct-Decm 1989(577)	33.7	29.3	23.0	12.4	0.9	0.8	25.0
Jan-March 1990(541)	42.3	30.0	17.8	9.0	0.7	0.1	18.8
All Groups	35.2	30.3	20.6	12.6	0.6	0.6	100.0
Sample	788	713	511	315	18	11	2356

Note: All percentages are calculated by weighting urban and rural observations by the multipliers derived in Appendix B.
Sample size in parentheses.

Table 11

Percent Distribution of Children age 6-71 months by WEIGHT FOR AGE Standard Deviation Category Using NCHS Reference Population (1989-90 Nutrition Module of Bangladesh)

Variable	Z-score Categories (Standard Deviations from the Median of the NCHS Reference Population)						
	-3.00 or Less	-2.99 to -2.00	-1.99 to -1.00	-0.99 to +0.99	1.00 to 1.99	+2.00 +more	Total
Age in completed months							
6-11(219)	21.8	35.1	32.7	9.9		0.6	9.6
12-23(407)	38.7	39.9	15.5	5.2		0.7	17.7
24-35(453)	29.5	36.7	25.1	8.5	0.3		19.5
36-47(418)	23.6	37.6	30.5	8.4			17.8
48-59(417)	19.8	41.7	32.2	6.3	0.1		17.4
60-71(442)	21.3	47.5	26.0	5.1	0.1		18.0
Area of Residence							
Urban(843)	21.6	41.1	28.0	9.0	0.2		11.5
Rural(1513)	26.7	40.0	26.3	6.8	0.1	0.2	88.5
Sex							
Male(1240)	23.9	40.9	28.6	6.2	0.2	0.2	52.1
Fem.(1116)	28.6	39.2	24.2	7.9		0.1	48.0
Season							
April-June 1989(690)	28.1	38.4	27.8	5.5		0.2	27.6
July-Sept 1989(548)	25.2	43.9	23.4	7.1	0.3		28.6
Oct-Decm 1989(577)	23.7	41.4	25.9	8.5	0.1	0.5	25.0
Jan-March 1990(541)	26.5	37.6	28.4	7.5			18.8
All Groups	25.9	40.6	26.2	7.1	0.1	0.2	100.0
Sample	584	953	634	179	3	3	2356

Note: All percentages are calculated by weighting urban and rural observations by the multipliers derived in Appendix B.
Sample size in parentheses.

Table 12

Percent Distribution of Children age 6-71 months by WEIGHT FOR HEIGHT Standard Deviation Category Using NCHS Reference Population (1989-90 Nutrition Module of Bangladesh)

Variable	Z-score Categories (Standard Deviations from the Median of the NCHS Reference Population)						
	-3.00 or Less	-2.99 to -2.00	-1.99 to -1.00	-0.99 to +0.99	1.00 to 1.99	+2.00 +more	Total
Age in completed months							
6-11(219)	1.2	13.2	36.2	47.2	2.1		9.6
12-23(407)	5.3	22.4	46.8	23.4	0.9	1.1	17.7
24-35(453)	1.0	14.0	43.4	40.7	0.9		19.5
36-47(418)	0.4	10.0	43.7	45.9			17.8
48-59(417)	0.1	8.8	48.7	42.0		0.4	17.4
60-71(442)	0.8	10.2	48.9	39.6	0.2	0.3	18.0
Area of Residence							
Urban(843)	1.3	12.7	47.5	37.4	1.0	0.1	11.5
Rural(1513)	1.5	13.2	45.0	39.5	0.5	0.3	88.5
Sex							
Male(1240)	2.2	13.1	45.5	38.8	0.5	0.3	52.0
Fem.(1116)	0.7	13.1	45.1	39.7	0.7	0.6	48.0
Season							
April-June 1989(690)	2.0	18.7	46.5	32.4	0.2	0.2	27.6
July-Sept 1989(548)	2.3	10.8	48.7	37.7	0.4	0.1	28.6
Oct-Decm 1989(577)	0.6	13.8	45.2	39.7	0.4	0.2	25.0
Jan-March 1990(541)	1.0	7.6	40.8	48.6	1.3	0.7	18.8
All Groups	1.6	13.1	45.7	38.8	0.5	0.3	100.0
Sample	33	307	1081	912	17	6	2356

Note: All percentages are calculated by weighting urban and rural observations by the multipliers derived in Appendix B.
Sample size in parentheses.

Table 13

Percent of Children age 6-71 months below 80 or 90 Percent of NCHS Reference Median Height-for-age, Weight-for-age and Weight-for-Height (1989-90 Nutrition Module of Bangladesh)

Variable	Height-for-age (below 90%)	Weight-for-age (below 80%)	Weight-for-Height (below 80%)
Age in completed months			
6-11(219)	25.4	64.3	12.0
12-23(407)	52.3	81.2	19.1
24-35(453)	45.0	67.0	9.9
36-47(418)	52.6	68.8	7.5
48-59(417)	53.3	70.2	4.6
60-71(442)	58.3	78.5	6.4
Area of Residence			
Urban(843)	41.7	69.9	8.3
Rural(1513)	50.6	72.5	9.9
Sex			
Male(1240)	49.6	72.0	8.9
Fem.(1116)	49.6	72.4	10.6
Season			
Apr.-June 1989(690)	42.8	72.8	14.8
July-Sept 1989(548)	53.9	73.9	9.1
Oct-Dec 1989(577)	47.9	70.3	8.7
Jan-Mar 1990(541)	55.3	71.3	5.0
All Groups	49.6	72.2	9.8
Sample	1115	1686	219

Note: All percentages are calculated by weighting urban and rural observations by the multipliers derived in Appendix B.
Sample size in parentheses.

Table 14

Percent of Children age 6-71 months by Gomez Classification Categories (1989-90 Nutrition Module of Bangladesh)

Variable	Percent of children by Weight-for-Age Categories Third degree	Second degree	First degree	Normal
Age in completed months				
6-11(219)	4.7	44.6	42.2	8.5
12-23(407)	10.1	51.4	33.4	5.2
24-35(453)	5.2	44.4	41.6	8.9
36-47(418)	8.5	41.8	41.8	7.8
48-59(417)	6.5	45.5	42.6	5.4
60-71(442)	6.2	51.8	38.2	3.8
Area of Residence				
Urban(843)	6.3	41.3	44.5	7.8
Rural(1513)	7.1	47.4	39.2	6.3
Sex				
Male(1240)	6.1	46.6	41.4	5.9
Fem.(1116)	8.0	46.8	38.1	7.1
Season				
Apr-June 1989(690)	8.1	47.3	39.6	4.9
Jul-Sept 1989(548)	5.3	51.3	36.2	7.1
Oct-Dec 1989(577)	7.0	47.3	38.2	7.5
Jan-Mar 1990(541)	7.1	41.2	44.8	6.9
All Groups	6.8	47.3	39.3	6.6
Sample	160	1063	971	162

Note: All percentages are calculated by weighting urban and rural observations by the multipliers derived in Appendix B.
Sample size in parentheses.
Normal: Weight for age atleast 90 percent of reference median
Mild or First degree malnutrition: Weight-for-age in between 75% and 89.9% of reference median
Moderate or second degree malnutrition: Weight-for-age in between 60 to 74.9 percent of reference median
Severe or third degree malnutrition: Weight-for-age below 60% of reference median.

(d) Sex of the child

A simple cross-tabulation of sex and nutritional status of children does not indicate significantly higher degree of malnutrition among female compared to male children. Prevalence of stunting is found to be similar for both male and female children, about 66 percent. However, relative proportion of female children severely under-weight is marginally higher than male (36.5 percent for female and 34.6 percent for male). The prevalence of wasting also appears to be more or less similar. For a better estimate aof relative nutritional status of male and female children, one should control for other household and child specific variables that might explain nutrition status of children.

(e) Seasonality

As mentioned earlier, the actual survey of 1989 was delayed due to 1988 floods. The survey of the quarters actually took place in June, Agust, October and January. June and August, although relatively slack months for agricultural activities, are better employment opportunity generating months than September to early November period. January can be considered a post-harvest period.

Prevalence of stunting (less than -2 SD height-for-age) is found to be highest during January-March (72.3 percent). Stunting is a long-term nutritional stress indicator and should not vary considerably over different seasons. Weight-for-age also shows very limited variability. Weight-for-height, which is affected by short term nutrition stress of individuals, show relatively better nutrition situation after the harvest of the crop in January. The highest prevalence of wasting is observed during June, a low employment opportunity month for rural Bangladesh, when 20.7 percent of children were found to be wasted.

(f) Relationship among wasting, stunting and underweight

Different anthropometric indicators summarize different types of nutritional problems. For a better understanding of the nutrition situation, it is important to analyze the prevalence of malnutrition by a combination of two or more anthropometric indicators. Tables 15, 16 and 17 below report the cross-tabulations among underweight, stunting and wasting. It can be noted from table 16 that more than 20 percent of children are both severely underweight and stunted. About 40 percent are either severely underweight or both. About 10 percent of children are wasted as well as stunted. Severe stuntig and wasting occurs in less than one percent of children.

Table 15

Cross-tabulation of Stunting and Wasting (1989-90 Child Nutrition Survey of Bangladesh)

		Percent of Children in Weight-for-Height Categories		
Height-for age group		Less than -3SD Severe	-3 to -2 SD Moderate	More than -2 SD Normal
LT -3 SD	Row %	1.9	12.7	85.4
severe	Column %	46.3	34.4	35.5
	Total %	0.7	4.5	30.3
-3 to -2	Row %	0.7	14.3	85.0
SD	Column %	14.0	33.1	30.1
Moderate	Total %	0.2	4.3	25.7
More than	Row %	1.7	12.5	85.8
-2 SD	Column %	39.7	32.6	34.4
Normal	Total %	0.6	4.3	29.4

Table 16

Cross-tabulation of Stunting and Underweight (1989-90 Nutrition Survey of Bangladesh)

Height-for age groups		Percent of Children in Weight-for-Age Categories: Less than -3SD Severe	-3 to -2 SD Moderate	More than-2 SD Normal
Less than -3 SD Severe	Row %	57.8	37.4	4.9
	Column %	78.5	33.1	5.1
	Total %	20.5	13.3	1.7
-3 to -2 SD Moderate	Row %	15.7	58.6	25.8
	Column %	18.1	44.2	23.1
	Total %	4.7	17.7	7.8
More than -2 SD Normal	Row %	2.6	26.6	70.8
	Column %	3.4	22.7	71.8
	Total %	0.9	9.1	24.2

Table 17

Cross-tabulation of Wasting and Underweight (1989-90 Nutrition Survey of Bangladesh)

Weight-for age groups		Percent of Children in Weight-for-Height Categories: Less than -3SD Severe	-3 to -2 SD Moderate	More than-2 SD Normal
Less than -3 SD Severe	Row %	4.3	30.9	64.8
	Column %	75.5	61.8	19.6
	Total %	1.1	8.1	17.0
-3 to -2 SD Moderate	Row %	0.9	11.0	88.1
	Column %	24.5	33.5	41.5
	Total %	0.4	4.4	35.3
More than -2 SD Normal	Row %	-	1.8	98.2
	Column %	-	4.7	38.8
	Total %	-	0.6	33.1

Only two percent of children who are severely stunted are also severely wasted. Similarly, less than 50 percent of severely wasted children are severely stunted as well. Although 78 percent of severely underweight children were also severely stunted, less than 60 percent of severe stunting cases belong to severe underweight category. These cross-tabulations clearly indicate that the target children will vary significantly depending upon the anthropometric indicator of malnutrition used for targeting purposes.

6.4 Comparative analysis of 1985-86 and 1989-90 surveys

Table 18 below compares the mean and standard deviations of seven anthropometric indicators for 1985-86 and 1989-90 survey years. The mean values for all anthropometric indicators are higher for the 1989-90 survey. Also, 1985-86 values were relatively more skewed than the 1989-90 distribution. However, excepting for the weight-for-height indicators, skewness were low in absolute value. A test of significance of the differences in mean values for the two surveys were carried out. The tests confirm that, the mean values in 1989-90 were higher than the mean values estimated using 1985-86 data.

Table 18

Mean and Standard Deviation of Different Anthropomentric Indicators for 1985-86 and 1989-90 Nutrition Surveys

Anothropometric Indicators	1989-90		1985-86	
	Mean	S. Dev.	Mean	S. Dev.
HFAZ	-2.51	1.52	-2.67	1.44
WFAZ	-2.38	1.02	-2.48	0.97
WFHZ	-1.17	0.95	-1.21	0.79
MHFA	89.51	6.04	89.75	5.85
MWFA	73.85	10.90	73.76	10.55
MWFH	89.05	8.49	89.10	7.46
MUAC	13.84	1.19	137.50	11.93

Tables 19 and 20 compare 1985-86 prevalence rates (using Z-score categores) with the results of 1989-90 nutrition survey. The prevalence of stunting by age groups show similar pattern for both the surveys. Graph 0.17 shows the prevalence rates for the two surveys by age categories. In both the surveys, 6 to 11 months age group fared much better than other groups in terms of the prevalence of stunting. The rates of stunting remains more or less stable after this youngest age category. However, the prevalence of stuntig was lower in 1989-90 for all age groups excepting the first age group. For the country as a whole, the prevalence of stunting has declined from 68.7 percent to 65.5 percent and prevalence of severe stunting has declined from 40.0 to 35.2 percent (Table 20).

Graph 0.17 : 1989-90 and '85-86 Prevalence Rates for Malnutrition

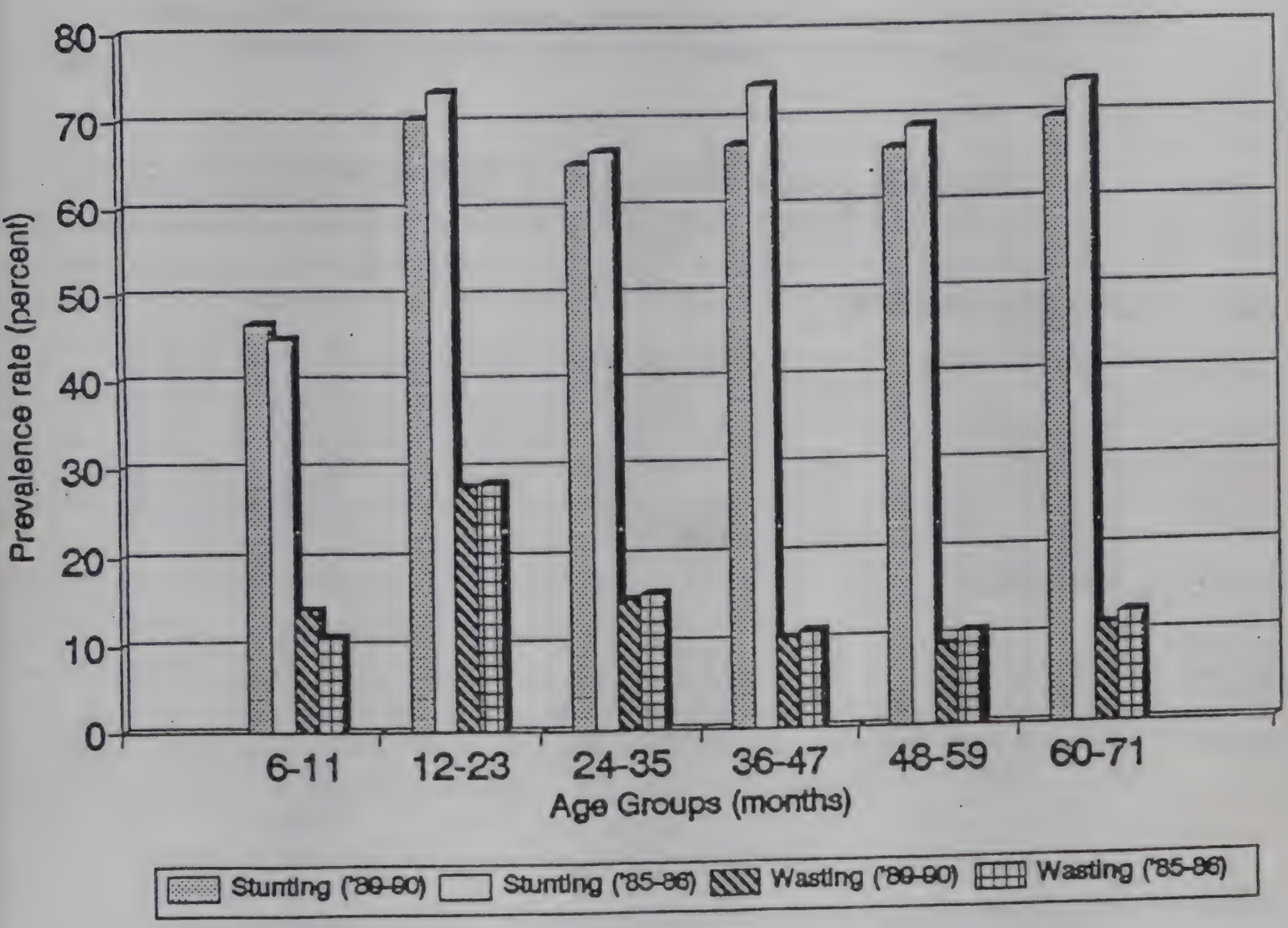


Table 19

Comparison of Malnutrition Prevalences (both Severe and Moderate 2SD) for 1989-90 and 1985-86 Surveys

	Percent of Children with Z-scores less than -2					
	Stunting		Underweight		Wasting	
	1989-90	1985-86	1989-90	1985-86	1989-90	1985-86
Age in completed months						
6-11	46.5	44.9	56.9	57.4	14.4	11.0
12-23	70.5	73.4	78.5	76.5	27.7	28.2
24-35	64.9	66.2	66.2	74.3	15.0	15.5
36-47	66.3	73.8	61.2	73.9	10.4	11.1
48-59	66.6	68.7	61.5	66.6	8.9	10.6
60-71	69.9	73.6	68.8	74.0	11.0	12.4
Area of Residence						
Urban	58.3	58.2	62.7	63.8	14.0	13.7
Rural	66.7	70.0	66.7	72.4	14.7	14.9
Sex						
Male	65.6	67.1	64.8	69.5	15.3	13.9
Female	65.9	70.5	67.8	73.8	13.8	15.9
Season						
July-Sept	59.8	71.3	66.5	72.9	20.7	18.3
Oct-Dec	68.8	67.9	69.1	71.6	13.1	16.2
Jan-Mar	63.0	71.4	65.1	70.9	14.4	9.0
April-June	72.3	64.3	64.1	70.5	8.6	15.1
All	**65.5**	**68.7**	**66.5**	**71.5**	**14.7**	**14.8**

Both surveys show higher prevalence of stunting in rural areas. Although, severe stunting rates were higher for female children in both surveys, the difference in prevalence in 1989 was only 2.0 percentage points compared to more than 4 points in 1985-86 survey. The overall rate of stunting was almost the same for both male and female children in 1989. No consistent seasonal pattern could be observed for stunting rates in both surveys.

From 1985-86 to 1989-90, the prevalence of wasting has remained constant at around 14.5 percent for the age group 6 to 71 months. The two worst age categories in terms of prevalence of wasting were 12-23 month and 24-36 months for both the surveys. Both the 1985-86 and 1989-90 surveys found that the age category 48-59 months were better-off than other age groups in terms of wasting rates. This is an expected result. Beyond age two, children can demand food and learn to feed themselves. This probably influences the short term nutritional status of children. The prevalence rate of wasting again shows an increase after the age group 48-59 months.

In both the surveys, the prevalence of wasting was found to be slightly higher in rural areas than in urban areas. The comparison of seasonal pattern of wasting for 1985-86 and 1989-90 is difficult due to differences in the time of the survey. For example, the first quarter survey in 1985-86 took place in April while in 1989-90, the survey was carried out in June. The survey months for 1985-86 and 1989-90 for the other three quarters were July and August, September-October and September, and January respectively. Therefore, although the third and fourth quarters are comparable, other two quarters are not strictly comparable. In both the surveys, fourth quarter was best in terms of prevalence of wasting the highest rate was observed in the first quarter for 1989-90 but in the second quarter for 1985-86.

Table 21 summarizes the prevalence of combined stunting, underweight and wasting. In 1989-90, about 20 percent of all children were severely stunted as well as severely underweight. In 1985-86, the rate was slightly higher, about 24 percent. About 13 percent of children were severely stunted and moderately underweight in 1989-90. The rates for other combinations are found to be more or less similar for the two survey years.

6.5 Nutrition status by household economic characteristics

The nutrition module of 1989-90 incorporated some selected economic variables from the Household Expenditure Survey into the nutrition data set. The variables copied from the HES schedules are : income, expenditure, food expenditure, medical expenditure, area of land owned and land area operated.

Table 20

Comparison of Severe Malnutrition Rates (<-3SD) for 1985-86 and 1989-90 Nutrition Survey

	Percent of Children with Z-scores Less than -3					
	Stunting		Underweight		Wasting	
	1989-90	1985-86	1989-90	1985-86	1989-90	1985-86
Age in completed months						
6-11	14.8	14.1	21.8	23.8	1.2	0.7
12-23	41.4	42.2	38.7	41.3	5.3	2.9
24-35	33.8	40.0	29.5	37.2	1.0	0.8
36-47	40.1	45.6	23.6	27.0	0.4	0.3
48-59	36.3	41.8	19.8	23.2	0.1	-
60-71	37.7	43.6	21.3	24.9	0.8	0.3
Area of Residence						
Urban	28.5	28.9	21.6	19.9	1.3	0.8
Rural	36.4	41.4	26.7	30.9	1.5	0.8
Sex						
Male	34.6	37.4	23.9	27.0	2.2	0.7
Female	36.5	43.1	28.6	32.9	0.7	1.0
Season						
July-Sept	29.7	42.2	28.1	35.4	2.0	0.8
Oct-Dec	37.3	38.6	25.2	30.8	2.3	0.8
Jan-Mar	33.7	39.7	23.7	25.1	0.6	0.4
April-June	42.3	39.6	26.5	27.2	1.0	1.2
Total	35.2	40.0	25.9	29.7	1.6	0.8

Table 21

Comparison of Malnutrition Prevalences for Different Combinations of Stunting, Underweight and Wasting, 1989-90 and 1985-86 Surveys (Percent of all Children)

	1989/90	1985/86
Severe Stunting - Severe Underweight	20.5	24.1
Severe Stunting - Moderate Underweight	13.3	14.6
Moderate Stunting - Severe Underweight	4.7	5.0
Moderate Stunting - Moderate Underweight	17.7	17.9
Severe Stunting - Severe Wasting	0.7	0.5
Severe Stunting - Moderate Wasting	4.5	5.8
Moderate Stunting - Severe Wasting	0.2	0.2
Moderate Stunting - Moderate Wasting	4.3	4.3
Severe Underweight - Severe Wasting	1.1	0.7
Severe Underweight - Moderate Wasting	8.1	9.7
Moderate Underweight - Severe Wasting	0.4	0.0
Moderate Underweight - Moderate Wasting	4.4	3.6

A. Nutrition status and household income and expenditure:

Household income and expenditure data were converted into per capital terms to control for the size of the households. The cross-tabulations of the variables with nutrition status of children are reproduced in tables 22 and 23. Annex table F6 shows the income distribution pattern among the surveyed households by their area of residence. The table shows that a higher proportion of low income households reside in rural areas. About 50 percent of all rural households reported a per capita income of Taka 4000 or less per year while for urban area the ratio is less than 25 percent. Similarly, about 23 and 7 percent of households in urban and rural areas respectively reported an income of more than Taka 8000 per capita.

Table 22 shows that the prevalence of severe malnutrition (defined by less than -3 SD) tends to decline with increasing per capita income. Prevalence of severe stunting is about 50 percent for income level less than Tk. 2,000 per capita per year while for households with income exceeding Tk. 10,000 per capita it is found to be only 12.5 percent. The prevalence of severe wasting shows no consistent pattern with income. However, the small sample size of the severely wasted children makes the prevalence rates by income classes unreliable. As expected, prevalence of severe malnutrition and per capital expenditure of households are also negatively related for all Z-score based indicators excepting the weight-for-height measure.

Table 23 shows the prevalence of moderate and severe malnutrition by income and expenditure classes. Again, the prevalence rates tend to decline with increasing income or expenditure of households except for wasting. Highest prevalence of wasting is observed for the per capita expenditure category Tk.5,000 to Tk.8,000.

Mean of household income, expenditure and other economic variables are reported in Table 24. As expected, mean income of households with severely malnourished children were lower than households with moderate malnourished children. For example, mean income of households with severely stunted children was found to be Taka 4804 while for households with moderately stunted and normally nourished children the mean income levels were 5157 and 6444, respectively. A similar pattern is observed for all three nutritional indicators.

B. Food expenditure and nutrition status:

Tables 25 and 26 show the relationship between food expenditure and nutritional status of children. Prevalence of severe stunting and underweight declines with higher food expenditures per capita. Prevalence of severe stunhting does not show any systematic relationship with per capita food expenditure. Moderate stunting, wasting or underweight appears to be poorly correlated with food expenditures.

Sevre forms of malnutrition show a much stronger relationship with percent of total expenditure allocated to food. Higher food to total expenditure ratio is considered a sign of higher vulnerability to food shortages. Therefore, higher ratio should be related with higher prevalence of malnutrition. As expected, all three forms of severe malnutrition reported in table 26 show an increasing tendency with increasing food to total expenditure ratio.

Graph 0.18 Prevalence of Severe Malnutrition by Household Income Per Capita

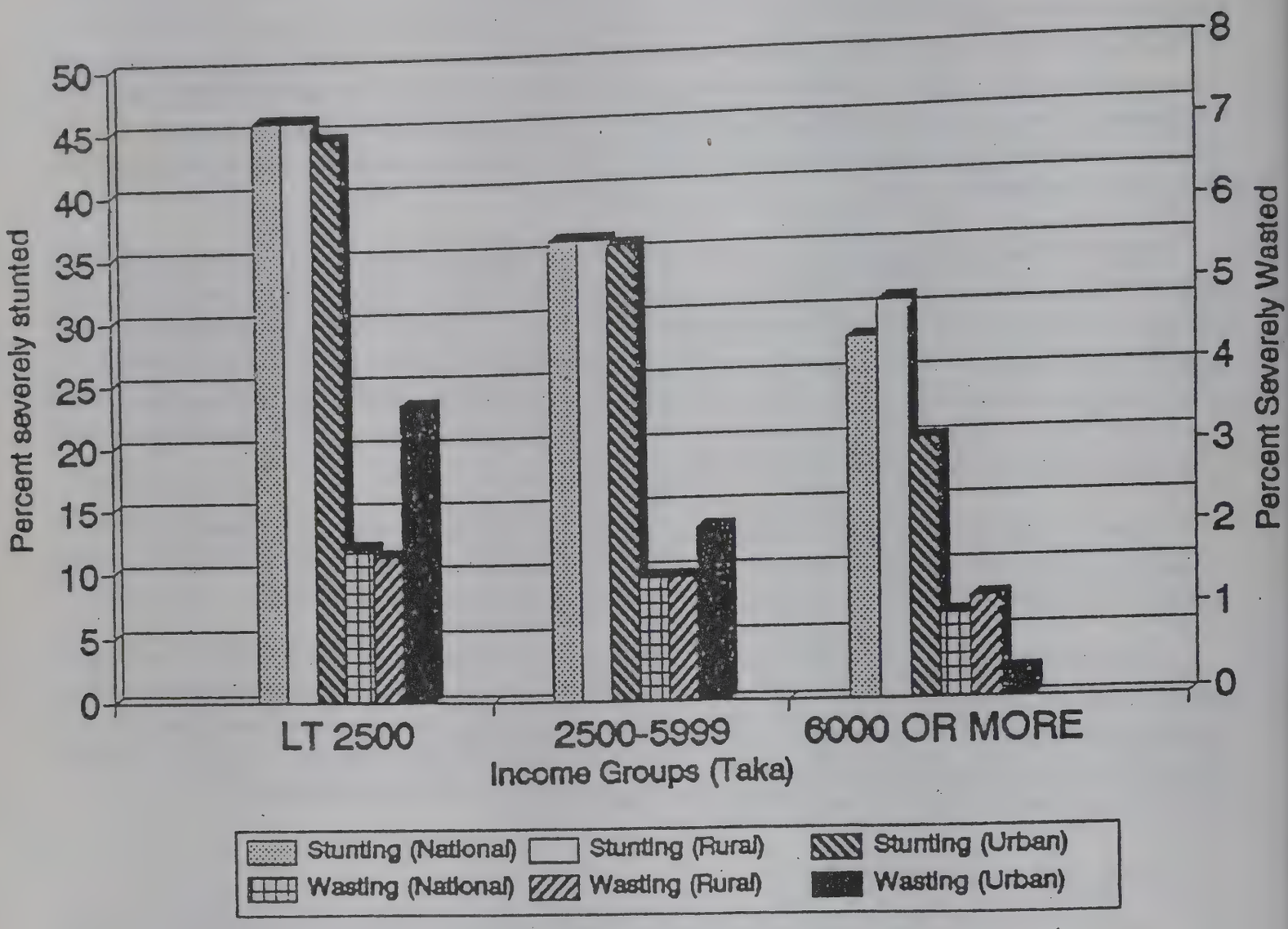


Table 22

Prevalence of Severe (<-3SD) Malnutrition by Annual Income and Expenditures Categories (1989-90 Nutrition Survey)

Annual Income/Capita (in Taka)	Height-for-Age	Weight-for-Age	Weight-for-height
Less than 2,000	49.5	32.3	1.5
2,000 - <2,500	44.1	31.8	2.2
2,500 - <3,000	40.1	31.1	0.1
3,000 - <4,000	38.0	27.0	1.9
4,000 - <5,000	37.0	25.4	1.4
5,000 - <6,000	28.7	22.7	2.2
6,000 - <8,000	34.2	28.9	0.9
8,000 - <10,000	20.7	15.0	1.2
Annual Expenditure/Capita (in Taka)			
Less than 2,000	52.4	35.5	1.6
2,000 - <2,500	44.8	30.5	1.0
2,500 - <3,000	36.6	25.1	1.2
3,000 - <4,000	38.3	28.3	1.6
4,000 - <5,000	34.1	25.1	2.1
5,000 - <6,000	32.3	26.9	1.1
6,000 - <8,000	32.9	26.5	1.4
8,000 - <10,000	22.6	14.6	0.8

Table 23

Prevalence of Severe and Moderate (<-2SD) Malnutrition by Annual Income and Expenditures Categories (1989-90 Nutrition Survey)

Annual Income/Capita (in Taka)	Height-for-Age	Weight-for-Age	Weight-for-height
Less than 2,000	81.3	75.4	15.6
2,000 - <2,500	72.0	68.4	14.3
2,500 - <3,000	74.1	69.8	11.8
3,000 - <4,000	62.9	65.6	16.5
4,000 - <5,000	66.6	70.7	14.4
5,000 - <6,000	65.2	63.7	14.1
6,000 - <8,000	67.1	66.0	17.1
> 8,000	50.9	54.4	10.3
Annual Expenditure/Capita (in Taka)			
Less than 2,000	80.9	72.9	14.9
2,000 - <2,500	72.6	74.5	13.5
2,500 - <3,000	67.9	65.7	15.0
3,000 - <4,000	65.6	67.7	16.8
4,000 - <5,000	64.9	64.7	11.9
5,000 - <6,000	71.6	72.1	17.5
6,000 - <8,000	63.0	63.8	16.6
> 8,000	50.0	52.9	8.3

Table 24

Mean Per Capita Income, Expenditure and Land Area Owned by Nutrition Status of Children (1989-90 Nutrition Survey of Bangladesh)

Malnutrition Categories	Mean per Capital level of Income (Taka)	Expenditure (Taka)	Medical Exp. (Taka)	Food Exp. (Taka)	Land (Dec.)
Height-for-age					
LT -3SD	4418	4378	72	3142	14.0
-3 to -2SD	5071	4872	86	3395	18.4
Above -2SD	5413	5241	90	3561	20.9
Weight-for-age					
LT -3 SD	4531	4473	70	3201	14.8
-3 to -2SD	4871	4736	83	3311	16.6
Above -2SD	5386	5198	92	3548	22.0
Weight-for-height					
LT -3 SD	4494	4439	61	3313	15.1
-3 to -2SD	4787	4626	86	3273	16.9
Above -2SD	4990	4860	82	3377	18.2
Mean Values	4956	4823	82	3362	18.0

Table 25

Prevalence of Severe and Moderate Malnutrition by Annual Food Expenditure Categories (1989-90 Nutrition Survey)

Food Expend. Per Capita (in Taka)	Prevalence of Severe (LT -3 SD) Malnutrition Height-for-age	Weight-for-age	Weight-for-height
Less than 2,000	42.4	30.2	1.3
2,000 - <2,500	38.8	26.9	1.4
2,500 - <3,000	37.2	27.2	1.1
3,000 - <4,000	33.2	26.4	1.6
4,000 - <5,000	32.6	25.6	3.3
5,000 - <6,000	33.3	21.7	0.9
6,000 - <8,000	26.0	15.2	-
8,000 or more	15.1	19.3	-

Food Expend. Per Capita (in Taka)	Prevalence of Moderate (-3 to -2 SD) Malnutrition Height-for-age	Weight-for-age	Weight-for-height
Less than 2,000	29.8	39.4	12.8
2,000 - <2,500	27.2	42.3	13.0
2,500 - <3,000	30.3	38.0	14.2
3,000 - <4,000	33.6	42.7	13.4
4,000 - <5,000	30.6	37.6	14.4
5,000 - <6,000	27.9	37.9	11.1
6,000 - <8,000	22.8	41.5	10.5
8,000 or more	40.0	25.8	8.5

Table 26

Prevalence of Severe and Moderate Malnutrition by Food Expenditure to Total Expenditure Ratios

Food Exp/ Total Ex.	Height for age Severe	Moderat	Weight-for-age Severe	Moderate	Weight-for-height Severe	Moderate	Total
LT 0.5	27.5	30.1	21.3	37.6	0.3	10.8	5.3
0.5-0.599	28.8	36.5	24.0	38.2	0.3	12.0	9.7
0.6-0.699	32.7	31.7	25.2	43.3	2.2	12.3	22.5
0.7-0.799	36.5	29.2	25.9	39.1	1.0	12.6	36.3
0.8-0.899	39.6	28.2	28.0	39.6	2.1	14.8	24.9
0.9 +	61.7	24.8	48.9	41.8	4.2	25.2	1.3

C. Medical expenditure and nutrition status:

Higher expenditure on medical services tend to reduce severe forms of malnutrition among children. Among households spending less than Taka 25 per capita on medical goods and services, the prevalence of severe stunting and underweight are about 40 and 28 percent, respectively. Medical expenditures category of Taka 150 or more per capita per year is associated with a lower level of severe stunting and underweight (30 and 21 percent respectively). Table 27 summarizes these results.

Unlike the level of medical expenditure, the ratio of medical expenditure to total expenditure does not show any systematic relationship with the prevalence rates. For example, prevalence of wasting (severe and moderate combined) remains more or less stable for all expenditure ratio categories less than 10 percent. For medical to total expenditure ratio of more than 10 percent, prevalence of wasting jumps to about 28 percent. For the other two nutrition indicators, the prevalence rates fluctuate as the ratio increases.

D. Land ownership and nutrition status:

Table 28 shows nutrition status of children by land area owned and land area operated. Stunting and wasting, both severe and moderate, show no significant relationship with land ownership or land operated. Prevalence of severe underweight declines with improving land ownership status of households. Prevelance of wasting and stunting for the lowest land ownership or operated category were higher than the largest land ownership category households but the changes do not show a consistent declining trend with increasing land ownership.

E. Construction materials used in residential houses:

Construction materials used in residential houses is often considered an indicator of the economic position of the households. The 1989-90 Nutrition Survey collected infomation on construction material of roof and wall. Table 29 reports the cross-tabulation of roof and wall materials and the prevalence of malnutrition among children.

From the table, it can be seen that about 47 percent of households had straw and bamboo roof for their residential structures. Another 49 percent used tin or wood for constructing the roof. Bamboo and mud or raw bricks are the predominant construction material used for wall.

Severe stunting and underweight among children from households using bamboo or straw as roof or wall materials show the highest rates. Households who reside in houses constructed with cement and brick show the lowest prevalence of severe malnutrition. It is interesting to note that the cost of construction materials and prevalence of severe malnutrition is quite evident for the underweight indicator. The relationship is also observed for stunting, although this appears to be less sensitive than underweight. Prevalence of wasting, both severs and moderate, is more than 16 percent if the roof materials is straw or bamboo. The rates are 14 and 12.7 percent for cement and tin/wood roof. Thus, costliness of construction materials does not show any systematic relationship with short-term measures of malnutrition, e.g., the prevalence of wasting.

Table 27

Prevalence of Severe and Moderate Malnutrition by Medical Expenditure per Capita and Medical Expenditure Ratio (1989-90 Nutrition Survey)

Medical Exp/cap (Taka)	Height for age Severe	Height for age Moderat	Weight-for-age Severe	Weight-for-age Moderate	Weight-for-height Severe	Weight-for-height Moderate	Total
LT 25	40.8	29.0	28.7	39.4	1.5	14.5	30.3
25-49	34.8	31.6	27.6	39.8	1.2	14.1	22.1
50-149	33.4	28.7	24.6	40.3	2.0	11.3	34.7
150 +	30.1	34.8	21.7	41.8	0.6	12.8	12.8
Medical Exp to Total exp ratio (percent)							
LT 0.1	45.0	18.8	26.6	37.9	4.0	8.1	3.2
.1-0.99	36.0	30.7	27.2	39.6	1.1	15.1	45.9
1.0-2.49	35.7	30.2	25.9	40.6	1.9	11.1	34.0
2.5-4.99	30.9	28.6	23.7	38.1	1.4	11.7	12.4
5.0-9.99	23.8	43.6	15.3	55.5	0.5	11.4	3.3
10 or +	32.9	32.9	22.5	39.8	-	27.7	1.1

Table 28

Land Ownership and Prevalence of Malnutrition (1989-90 Nutrition Survey)

Land Operated Groups (decimal)	Height-for-Age		Weight-for-Age		Weight-for-Height		
	Severe	Moderate	Severe	Moderate	Severe	Moderate	Total
0-19	37.0	30.8	26.8	40.6	1.2	14.0	66.0
20-29	36.6	29.1	26.0	41.9	2.3	13.4	10.0
30-39	36.5	25.4	24.3	46.4	2.5	10.1	7.5
40-49	33.2	33.7	24.9	35.4	3.4	5.6	5.1
50-74	28.7	28.0	22.7	32.0	0.9	13.5	6.5
75+99	33.0	25.5	18.4	38.7	-	7.4	3.1
100 +	10.8	38.6	18.6	38.0	-	18.4	1.9
Land Owned							
0-19	38.0	29.8	27.6	40.9	1.5	13.6	71.8
20-29	31.2	36.0	24.7	41.8	0.8	14.1	7.2
30-39	31.9	24.1	20.5	46.2	2.5	11.4	5.2
40-49	28.1	31.7	24.5	26.5	3.4	5.3	5.3
50-74	31.9	30.3	21.4	35.7	1.2	12.7	5.9
75+99	32.7	24.0	22.5	35.9	-	8.1	2.2
100 +	12.5	41.4	18.6	41.4	-	21.5	2.5

Note: Percent of observed in the land ownership/operated category 75-99 and 100+ are too small _ _

Table 29

Construction Material Used in Residential Structures and Prevalence of Malnutrition (1989-90 Nutrition Survey)

	Ht-for-age Z		Wt-for-age Z		Wt-for-Ht Z		Total
Roof Material	Sever	Modera	Sever	Modera	Sever	Modera	
Straw/bamboo	37.1	28.6	29.8	40.0	1.5	15.2	47.2
Tali	35.7	23.2	18.4	47.1	-	11.8	1.5
Tin/Wood	35.1	32.0	23.6	40.3	1.6	11.1	48.7
Cement	16.2	29.8	12.9	34.3	0.6	13.3	2.6
Wall Material							
Bamboo	41.3	29.5	29.6	41.4	1.5	13.6	57.7
Mud/rawbrick	29.8	30.7	23.6	39.6	0.9	12.1	24.4
Tin/Wood	30.7	32.2	23.1	38.4	3.0	13.3	11.4
Brick/Cement	14.3	31.5	10.8	33.0	0.5	11.8	6.5

6.6 Nutritional status by water and sanitation

In Bangladesh, 85 percent of all households reported tubewells as the source of drinking water. Only 3.1 percent had access to piped water supply. Others use pond, tank, river or well for drinking water supply. For other household purposes, a pond or tank is the predominant source of water (46 percent). Less than one third of all households surveyed mentioned tubewells as the source of wate for non-drinking purposes. Only 1.5 percent reported purifying the drinking water. This is also an expected result. Tubewell water is considered clean and safe and households using tubewell water do not take any steps to purify the water.

Nutrition status of children by source of drinking water is reported in table 30. Water quality defined by the source does not show any impact on prevalence of wasting. Water from a pond or tank is considered of lower quality than tubewell water; however, prevalence of wasting for children belonging to households who use tubewell water for drinking purposes was higher (14.8 percent for tubewell compared to 11.3 percent for pond and tank as the source of water). Severe stunting and underweight was lowest among the tap water users. Prevalence of severe malnutrition was also lower for households which purify the drinking water.

About 84 percent of all households reported using open space as the toilet facility for the household, of which 48 percent used a fixed open space. Less than 10 percent use sanitary pit or flush toilet. Toilet facility and prevalence of malnutrition do not show any systematic relationship in a simple two-way cross-tabulation.

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Table 30

Source of Water and Prevalence of Malnutrition (1989-90 Nutrition Survey)

	Height-for-age		Weight-for-age		Weight-for-ht.		Total%
	severe	moderate	severe	moderate	severe	moderate	
Sources of Drinking Water							
Tube well	36.7	29.7	26.4	39.3	1.7	13.1	85.6
Tap	17.6	31.9	15.6	43.1	0.9	11.4	3.1
Open well with wall	24.2	40.5	18.5	54.7	-	13.5	2.8
Open well	26.3	48.7	26.3	48.0	-	13.3	2.1
Pond/tank	39.8	24.3	33.1	40.0	-	11.3	4.9
Purified Water ?							
Yes	26.6	26.6	18.3	43.5	-	11.4	1.5
No	35.7	30.3	26.3	40.0	1.5	13.1	98.5
Method of Purification							
Boiling	17.7	28.1	24.8	36.7	-	13.9	0.8
Add Alum	37.5	24.8	10.5	51.8	-	8.3	0.7
Sources of water for Household Use							
Tubewell	34.2	30.6	22.2	40.9	1.0	11.5	30.2
Tap	17.0	32.3	15.8	41.8	1.3	12.3	3.0
Open well with wall	26.2	38.8	21.8	50.9	2.0	12.6	3.4
Open well	34.8	35.7	29.3	38.2	-	14.5	4.1
Pond/tank	37.6	29.9	29.1	39.1	2.0	14.0	46.4
River/ Canal	38.0	26.4	27.3	38.8	1.0	13.7	12.2

Note: Water Sources Used by less than 1% of cases not reported in the table.

6.7 Nutritional status by level of mother's education

The survey found that about 16 percent of mothers or caretakers are literate (able to write a letter). Among the literate mothers and care-takers, about 60 percent attended school for less than five years. Another 28 percent reported six to nine years of schooling. Only aobut 12 percent of literate mothers had more than 10 years of schooling.

Mother's education has a significant impact on the nutritional status of children. Note from table 31 below, prevalence of severe stunting for children with literate mothers or care-takers was found to be 26.3 percent compared to more about 37 percent for children cared by illiterate mothers. Severe underweight was also significantly higher among children with illiterate mothers or care-takers. Prevalence of severe and moderate wasting were also found to be slightly lower for children whose mothers are literate.

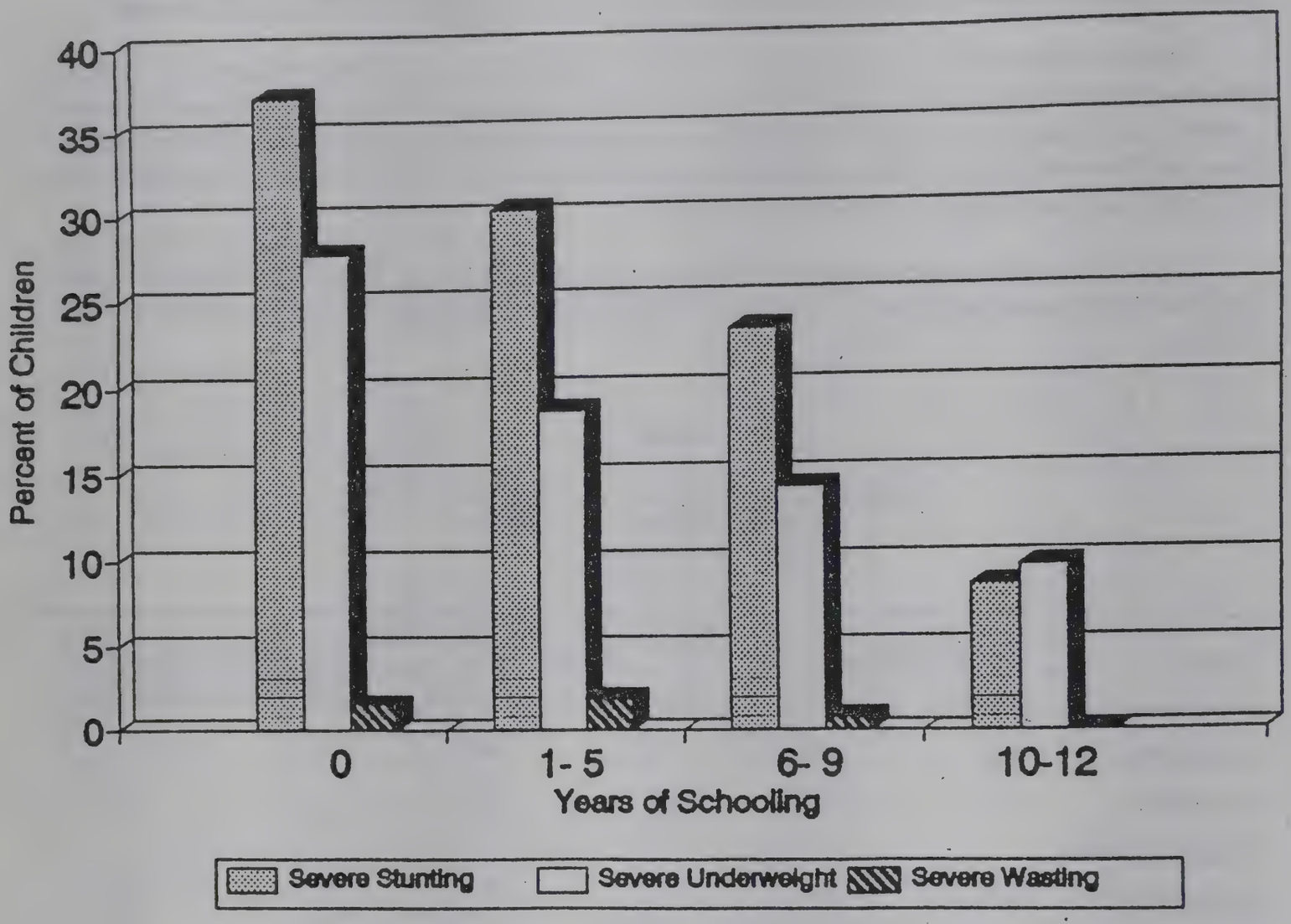
Years of schooling of the mothers also show a strong consistent relationship with the nutritional status of children. Severe wasting, underweight and stunting all decline with increasing years of schooling of the mother or care-taker.

Table 31

Nutrition Status of Children by Literacy and Years of Schooling of Mothers or Care-takers (1989-1990 Nutrition Survey)

Literate	Percent of Children in Z-score Categories					
	Height-for-age		Weight-for-age		Weight-for-height	
	Severe	Moderate	Severe	Moderate	Severe	Moderate
Yes (16.0%)	26.3	33.7	16.4	42.1	1.4	12.8
No. (84.0%)	37.3	29.6	28.0	39.7	1.5	13.2
Years of Schooling						
Zero (84.0%)	37.3	29.6	28.0	39.7	1.5	13.2
1-5 (9.6%)	31.0	33.2	18.4	44.9	2.1	13.4
6-9 (4.5%)	23.9	37.7	14.8	41.8	0.5	11.2
10-12 (1.9%)	8.2	27.0	10.1	29.2	-	13.5

Graph 0.19 Prevalence of Malnutrition by Mother's Years of Schooling



6.8 Nutritional status by other health related variables

A. Breast-feeding, weaning practices and nutrition status

(a) Breast-feeding

Breast-feeding is almost universal in Bangladesh. The 1989-90 Nutrition Survey found that 99.7 percent of all children were breast-fed. The ratio is practically 100 percent in rural areas and 98.4 percent in urban areas. At the time of the survey, about 41 percent of children were being breast-fed. Again, it is higher in rural areas (42%) than in urbans areas (33%).

The prevalence of severe stunting is slightly lower for children being breast-fed at the time of the survey (34.2 percent) compared to children not under breast-feeding (36.5 percent). However, the prevalence of both underweight and wasting are much higher for children presently being breast-fed than children not being breast-fed. Since, breast-feeding and age of children are related, the impact of the age variable confound the impact of breast-feeding duration. The prevalence of severe wasting was found to be 2.5 percent among children still being breast-fed while 0.8 percent for others. Moderate wasting was 18.5 and 9.4 percent for children currently being breast-fed and children not being breast-fed at the time of the survey respectively. The results are summarized in table 32.

The duration of breast-feeding may be a possible explanation for this unexpected result. In Bangladesh, not only is breast-feeding almost universal, but the duration of breast-feeding is also very long. The 1989-90 survey shows that about 38 percent of children presently being breast-fed were more than 2 years of age. It is possible that food scarcity at the household level tends to extend the duration of breast-feeding. In a poor society with adverse environmental condition, breast-feeding could be the most efficient form of transforming limited availability of food into nutrients for children.

The survey also asked the mothers about the duration of breast-feeding for children not currently being breast fed. More than 93 percent of children were breast-fed for 12 months or longer with 46 percent for more than 2 years. No strong systematic relationship is observed between the duration of breast-feeding and nutrition status of children.

(b) Weaning food and practices

The survey found that 79 percent of mothers introduce rice based food as the first solid food for the babies. About 8 percent of the surveyed children received cream of wheat as their first solid food. About two-thirds of all children received their first solid food by the age of nine months. Only seven percent of children were introduced solid food at 12 months of age or above. The relationship between age at first solid food introduced and nutritional status of children is also not clear from a crosstabulation of the variables. The prevalence of stunting appears to be marginally lower for children who were introduced to solid food at the age 3 to 8.9 months than for other children. Wasting was found to be lowest for children who received first solid food after the age of 12 months (table 33).

Table 32

Breastfeeding and Prevalence of Malnutrition (1989-90 Nutrition Survey)

	Ht-for-age Z		Wt-for-age Z		Wt-for-height Z		Total%
	Sever	Modera.	Sever	Moderat	Severe	Moderate	
Presently breast-fed?							
Yes	34.2	30.6	33.2	39.2	2.5	18.5	40.9
No	36.5	30.0	21.3	40.8	0.8	9.4	59.1
Ever breast-fed?							
Presently breast-fed	34.2	30.6	33.2	39.2	2.5	18.5	40.9
Yes	36.4	30.0	21.2	40.9	0.7	9.3	58.8
No	43.9	30.0	41.4	12.4	20.2	22.0	0.3
Duration (months)							
Currently breast-fed	34.2	30.6	33.2	39.2	2.5	18.5	40.9
0-5.9	29.0	27.5	21.4	36.5	9.5	7.7	1.3
6-11.9	45.0	27.0	23.5	44.8	0.5	18.7	2.6
12-17.9	39.5	30.8	25.2	44.4	1.6	12.1	11.8
18-23.9	43.2	28.5	24.8	38.4	0.4	6.4	15.8
24+	23.7	28.0	17.4	40.4	0.3	8.8	27.2

B. Incidence of diseases, immunization and nutrition status:

About a quarter of all children were reported to have at least one attack of diarrhoea during the three months preceding the interview date. Since diarrhoea reduces the supply of nutrients at the cellular level in the short run, it should affect short-term nutritional status. Prevalence of wasting was found to be much higher for the children who reported at least one attack of diarrhoea in the last three months compared to other children. About 22 percent of children who suffered from diarrhoea were severely or moderately wasted compared to only 12 percent for others. It is interesting to note (table 34) that both stunting and underweight rates are found to be higher for children reporting at least one episode of diarrhoea during the last three months.

Among the diarrhoea sufferers, about 66 percent experienced just one episode of the disease, 23 percent suffered twise, 8 percent suffered thrice and the rest more than three times in the last three months. On the average, children who suffered from diarrhoea reported 1.6 attacks during the last three months.prevalence of severe forms of malnutrition increases consistently with increasing frequency of attacks. For example, severe stunting increases from a prevalence rate of 35.4 percent for only one attack to 43.0 percent for three attacks. Wasting increases from 12 percent for children without any diarrhoeal attack in the last three months to 31 percent for children reporting three attacks.

The survey also asked the respondents whether the child had any attack of diarrhoea during the last two weeks. Only 7.6 percent of children had at least one diarrhoeal attack during the last two weeks. Severe stunting, underweight and wasting are found to be significantly higher for children who reported to have diarrhoeal attack during the past two weeks.

Both in rural and urban areas, the use of ORS is found to be quaite widespread. In urban areas, 17 percent of children are usually treated with home made salt-sugar solution, 63 percent use ORS packets and only 0.4 percent use rice based solution. In rural areas, use of homemade solutions are much more common: more than 28 percent reported the use of homemade sugar and salt solution. The ORS packets are used to treat diarrhoea for about 50 percent of rural children.

Prevalence of fever or severe cough in the last two weeks also is associated with the nutritional status of children. In 1989-90, about 27 percent of children were reported to have fever or severe cough in the two weeks before the survey. Again, children reporting fever or cough show higher prevalence of wasting, underweight and stunting. About 9 percent of children reported to have measles during the last three months. Prevalence of severe forms of malnutrition was also higher for children who experienced measles during the last three months.

Table 33

Weaning Food and Prevalence of Malnutrition (1989-90 Nutrition Survey)

	Ht-for-age Z		Wt-for-age Z		Wt-for-height Z		Total%
	sever	moderat	severe	moderate	severe	moderate	
First Solid food							
No solid	17.2	33.0	29.4	31.1	-	18.0	2.5
Cream of wheat	31.5	29.1	24.3	40.4	0.7	11.5	8.0
Rice	37.2	30.8	26.7	40.8	1.5	13.4	79.2*
Solid food (canned)	17.2	32.5	8.3	41.8	-	12.6	1.8
Rice with pulses	23.3	12.2	3.6	48.6	-	6.4	0.4*
Eggs	26.8	34.8	32.9	34.8	6.7	12.7	1.6*
Other	34.8	23.9	24.7	35.5	1.8	10.4	6.4
Age (solid food)							
Only milk still	17.0	35.5	29.1	30.8	-	15.7	2.5
0-2.9	42.2	24.7	34.0	33.5	-	15.9	4.8
3-5.9	34.4	30.0	26.8	36.9	1.5	13.0	26.1
6-8.9	34.1	30.1	26.6	40.6	1.7	14.2	35.2
9-11.9	39.3	30.7	24.3	44.2	1.8	11.9	24.1
12+	35.4	32.0	21.9	42.5	1.0	9.4	7.2

* The percentages are not significant due to the small sample size

Table 34

Incidence of Childhood Diseases and Prevalence of Malnutrition (1989-90 Nutrition Survey)

	Ht-for-age Z		Wt-for-age Z		Wt-for-ht Z		Total%
	sever	moderat	severe	moderat	severe	moderat	
Diarrhoea							
Had diarrhoea in the last 3 months?							
Yes	37.2	31.3	35.7	37.7	2.2	20.4	23.8
No	34.9	29.9	23.0	40.9	1.2	10.8	75.7
Frequency during last three months							
0	35.0	29.9	23.1	40.9	1.2	10.9	76.0
1	35.4	32.6	33.8	36.6	2.0	18.6	15.6
2	39.6	30.0	36.0	37.5	3.7	22.8	5.8
3	43.0	28.8	48.8	41.5	2.8	28.3	2.0
Diarrhoea in last 2 weeks?							
Yes	42.9	27.5	40.8	40.3	2.8	22.5	7.6
No	34.6	33.1	33.2	36.4	1.9	19.3	16.3
Remedy used in case of diarrhoeal attack							
Homemade							
Saline	32.4	31.2	24.6	39.6	1.4	13.9	26.7
ORS Packet	35.4	29.1	26.3	39.8	1.5	12.6	51.6
Rice powder	49.4	9.9	34.2	13.1	-	22.5	0.6
Green cocon.	46.5	31.7	25.7	54.3	-	3.0	1.0
Medicine	39.0	30.6	27.1	41.9	0.7	12.1	15.4
ORS+Medicin	42.7	38.1	27.3	38.6	3.4	12.2	2.4
Others	33.5	40.0	31.9	44.3	2.9	26.1	2.1
Fever or severe cough during last 2 weeks?							
Yes	37.6	30.9	33.7	40.3	2.5	17.4	27.0
No	34.8	30.0	23.3	40.0	1.1	11.5	73.0
Measles during last 3 months?							
Yes	38.3	32.9	33.6	37.5	2.8	15.7	8.6
No	35.3	30.2	25.4	40.3	1.4	12.9	91.4

Table 35

Immunization and Prevalence of Malnutrition (1989-90 Nutrition Survey)

	Ht-for-age Z		Wt-for-age Z		Wt-for-Ht Z		Total%
	sever	moderat	sever	moderat	severe	moderat	
Immunizations against any childhood diseases?							
Yes	35.2	32.44	26.8	40.1	1.5	15.1	32.6
No	35.6	35.0	25.7	40.1	1.4	12.2	66.8
Immunized against tetanus?							
Yes	28.0	35.8	24.3	44.0	0.7	17.6	9.6
No	36.3	29.6	26.3	39.7	1.6	12.6	90.4
Immunized against Polio?							
Yes	33.0	34.2	25.5	41.0	1.1	15.0	16.3
No	36.0	29.4	26.3	39.9	1.6	12.7	83.3
Received BCG vaccine?							
Yes	36.0	31.5	26.8	40.5	1.7	14.8	29.4
No	35.3	29.7	25.9	39.9	1.4	12.5	70.6
Received Measles vaccine?							
Yes	29.2	39.6	28.1	40.5	2.1	16.2	11.4
No	36.3	29.0	25.9	40.0	1.4	12.7	88.6
Received DPT vaccine?							
Yes	33.2	34.5	25.3	43.2	1.5	15.0	16.4
No	36.0	29.4	26.3	39.5	1.5	12.7	83.6

The survey found that about a third of all children were immunized against at least one childhood diseases. The prevalence of malnutrition was not significantly different for immunized and non-immunized children. BCG injection is the most common type of immunization in the country, with immunization coverage of about 30 percent. More that 16 percent children were immunized against Polio and DPT and about 11 percent against measles. Table 35 shows the relationship between immunization and prevalence of malnutrition.

C. Delivery practices and nutrition status:

Table 36 shows the percent of birth attended by four different categories of attendants. As expected, about 55 percent reported the presence of relatives and another 39 percent reported having non-trained midwives as birth attendant. Urban households reported use of better trained birth attendants : about 10 percent of the births in urban areas were attended by trained midwives and another 14 percent by professional nurses or physicians. However, even in the urban areas, most households used non-trained midwives.

Table 36

Attendant at the Time of Birth of the child and Prevalence of Malnutrition

Attendant Categories	Percent of total			Percent of children malnourished			
	Rural	Urban	Total	Height-for-age		Weight-for-height	
				<-3SD	<-2SD	<-3SD	<-2SD
Relative	57.7	35.2	55.2	38.0	66.8	1.7	14.4
Trained mid-wives	2.2	10.1	3.2	28.4	60.3	4.4	13.9
Non-trained mid-wives	38.5	40.9	38.8	34.0	66.5	1.1	14.8
Professional nurse/doctor	1.5	13.7	2.9	17.9	43.0	-	17.7

The choice of birth attendant should not affect the short-term nutritional status of children. Still, the cross-tabulation suggests some relationship between stunting and the extent of formal training of the birth attendants. Severe stunting among children was found to be highest if the birth attendant was reported to have been a relative. Mothers who had professional nurses or physicians as birth attendants have children with the lowest prevalence of severe stunting, about 17 percent. Wasting, both severe and moderate, show no systematic relationship with the category of birth attendant used. This relationship between categories of birth attendant and the prevalence of wasting may not be due to the use of a specific type of birth attendants perse. It is likely that the households using better trained attendants are also well-off in terms of their long-term economic and social situations and the observed negative relationship between level of training of the birth attendant and the prevalence of stunting may have been influenced by the socio-economic variables as well.

The instruments used to cut the umbilical cord are basically bamboo parts and blade or knives. About 78 percent reported the use of blades or knives (rural 73%, urban 90%). In rural areas, 25 percent of mothers reported use of bamboo parts, which was less than 7 percent in urban areas.

For about 56 percent of cases, the instruments were cleaned using boiling water and for another 5 percent cases, antiseptic lotions were used. It is interesting to note that about 13 percent reported cleaning the instruments by methods not listed in the questionnaire. Type of instruments used to cut the umbilical cord does not show any relationship with the nutrition status of children.

Nutritional status of children shows significant variations with the method of cleaning the instrument used to cut the umbilical cord, as reported in Table 37. Children from households who mentioned using water, (not boiled) show highest degree of severe stunting and underweight compared to children from those households who used boiling water or antiseptic chemicals. For example, the prevalence of severe stunting increases from 22.3 percent for children from antiseptic chemical users to more than 37 percent for households using water.

Table 37 also shows that about 14 percent of mothers received a full dose of tetanus vaccination before delivery. Again, mothers who received full doses of tetanus vaccinations have children with lower prevalence of severe stunting, underweight and wasting. However, the differences in prevalence rates between these two groups are quite small.

Table 37

Child-birth Practice and Prevalence of Malnutrition
(1989-90 Nutrition Survey)

(In percent)

	Height-for-age		Weight-for-age		Weight-for-height		Total
	severe	moderate	severe	moderate	severe	moderate	
Birth attendants							
Relative	38.0	28.8	28.0	40.3	1.7	12.7	55.2
Trained mid-wife	28.4	31.9	23.0	35.7	4.4	9.5	3.2
Non-trained mid-wife	34.0	32.5	24.3	40.9	1.1	13.7	38.8
Nurse	17.9	25.1	19.4	30.0	-	17.7	2.9
Instruments used to cut umbilical cord							
Bamboo	37.3	33.0	28.0	38.0	0.7	15.6	19.6
Blade	35.3	29.7	26.0	40.4	1.7	12.5	78.4
How the Instruments were cleaned ?							
Water only	37.5	33.9	27.5	38.9	1.0	13.8	19.6
Boiled water	35.3	30.0	25.3	42.0	1.7	11.7	56.1
Antiseptic lotion	22.3	25.5	18.7	29.0	1.3	13.0	5.2
Mother received full dose of tetanus vaccine before births ?							
Yes	32.7	33.2	25.1	40.9	1.1	16.0	13.5
No	36.0	29.8	26.4	40.0	1.5	12.7	86.1

D. Other health practices and nutrition status of children:

About 42 percent of children had A Vitamin a capsule during the last six months. Children who received the vitamin A capsules were not better-off than other children in terms of stunting and underweight or wasting. In Bangladesh, less than one percent of households reported using iodized salt. Since the sample size of iodized salt users is so small, comparison of nutrition status of children based on the use or non-use of iodized salt will be misleading.

In Bangladesh, 60 percent of households know how to prepare a mixture of Oral Rehydration Salt (ORS). Severe stunting and underweight for children belonging to households who know how to prepare ORS appears to be slightly better than children from other households. Prevalence of severe stunting was found to be 33 percent if households know about how to prepare the ORS and more than 38 percent if they cannot prepare the ORS. The rates for underweight were 25 and 27 percent respectively for these two groups of households.

More than 74 percent of households reported consuming vegetables grown in home gardens. Children from households who reported producing all the vegetables they consume show the highest prevalence of both severe and moderate stunting. Those who produce less than 50 percent of their needs were found to be better-off in terms of nutrition status of children than households who produce more than 50 percent of their vegetable consumption needs.

Table 38

Frequency distribution of children by area and time period, 1989-90

Row %, Col % Col. % Time period	National		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
All periods	100.0 100.0	2356	11.6 100.0	843	88.4 100.0	1513
1 June, 1989	100.0 30.3	690	10.7 27.8	231	89.3 30.6	459
2 August, 1989	100.0 21.9	548	14.6 27.5	232	85.4 21.1	316
3 October, 1989	100.0 23.0	577	13.4 26.5	228	86.6 22.6	349
4 January, 1990	100.0 24.8	541	8.5 18.2	152	91.5 25.7	389

E. National descriptions of weight-for-age:

The mean weight-for-age of the sample population (unweighted) was 74.5% of NCHS standard (Table-39). It was 73.6% in 1985-86. Since weight-for-age includes both stunting and wasting, this seemingly low figure is not surprising. On average, Bangladesh children 6-71 months of age are underweight using the cut off point of 80% of reference median.

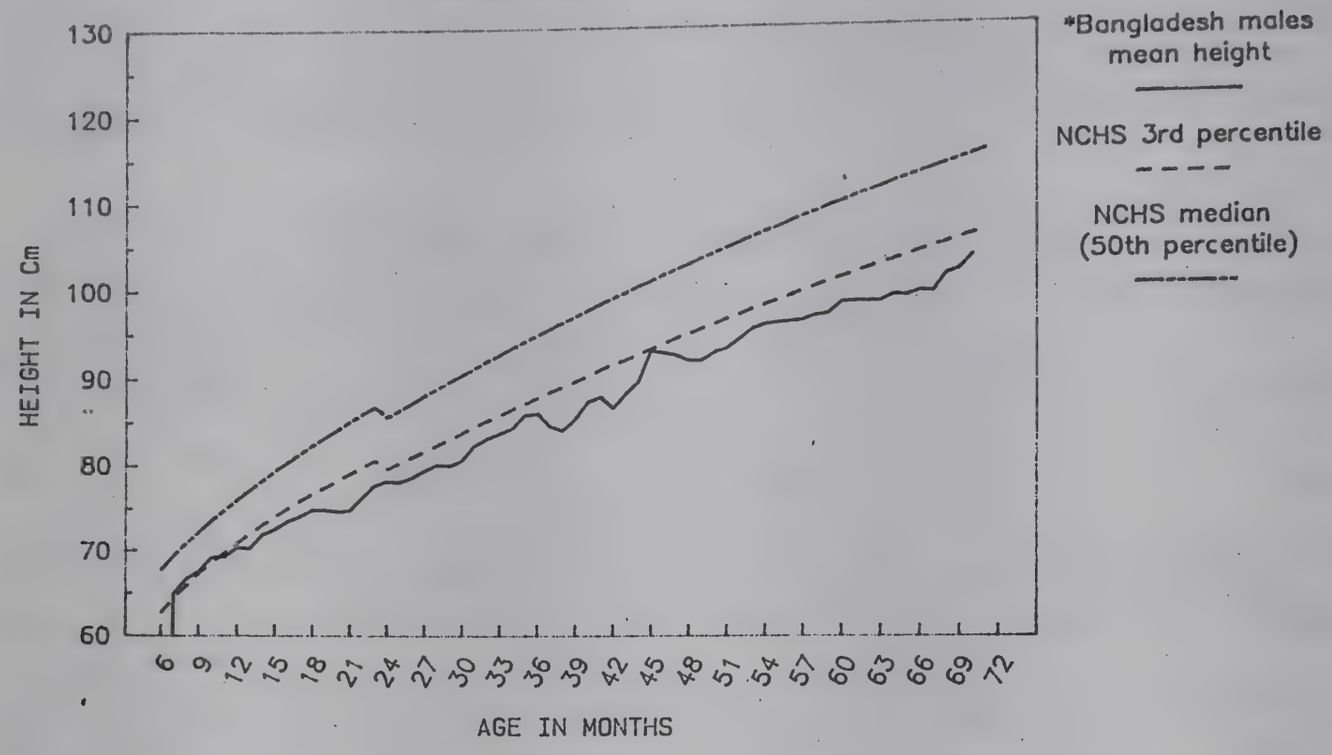
Table 39

Mean weight for age by area and sex

	National		Urban		Rural	
	1985-86	1989-90	1985-86	1989-90	1985-86	1989-90
Total	73.6 ± 10.4	74.5 ± 12.0	75.3 ± 10.3	75.8 ± 13.8	72.4 ± 10.3	73.8 ± 10.8
Male	74.1 ± 10.1	75.1 ± 12.3	75.8 ± 10.1	76.2 ± 13.9	71.8 ± 10.6	74.0 ± 10.4
Female	73.1 ± 10.6	73.4 ± 11.0	74.8 ± 10.4	69.2 ± 8.5	72.4 ± 10.3	73.7 ± 11.1

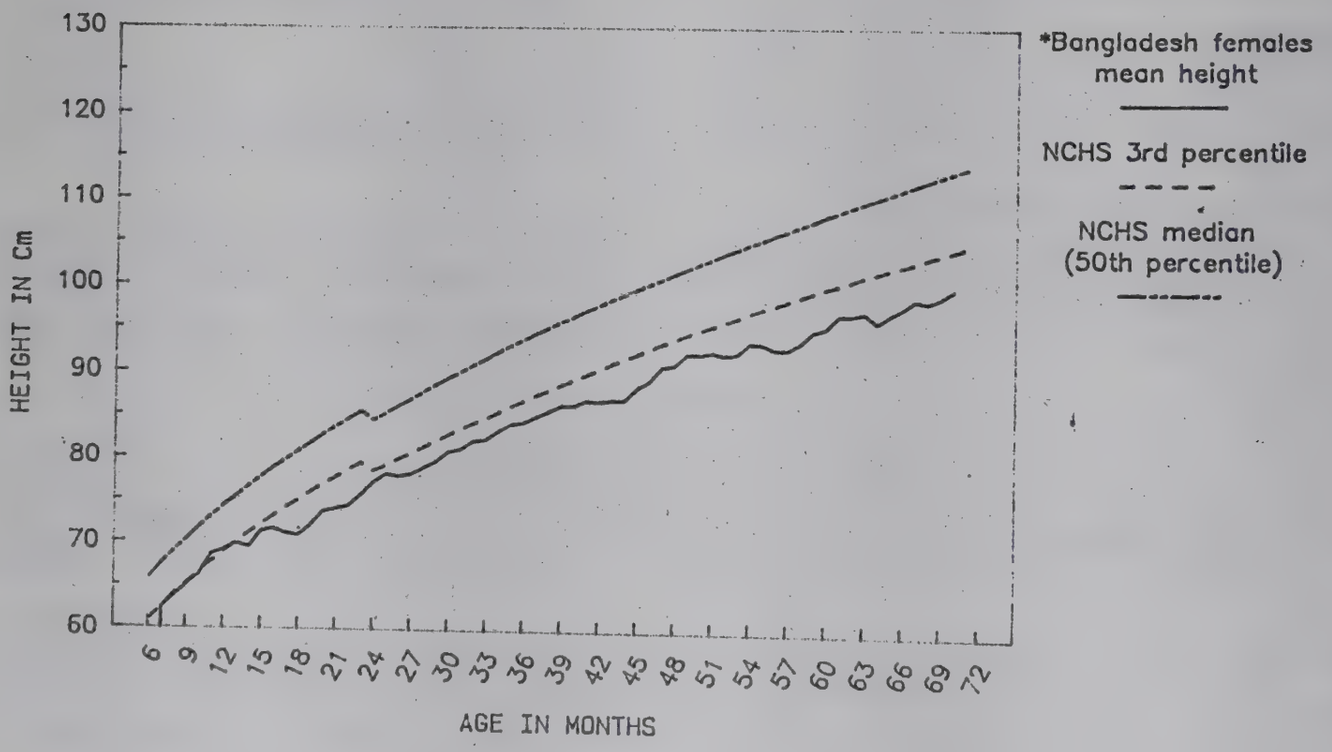
This is confirmed when the mean weights by age group of males and females are plotted against the 3rd and 50th percentiles of NCHS reference by age group. Graphs 0.19 and 0.20 show that the mean weights by age group for both sexes fall below the 3rd percentile of NCHS reference standard.

Graph 0.20 Distribution of height by age of male children in comparison with reference standard.



* 3 Months weighted moving average

Graph 0.21 Distribution of height by age of female children in comparison with reference standard.



* 3 Months weighted moving average

Table 40

Nutritional status by Gomez classification by area

Area	Total		Normal		Mild		Moderate		Severe	
	Weighted %	Actual No.	Weighted %	Actual No.	Weighted %	Actual No.	Weighted %	Actual No.	Weighted %	Actual No.
National	100.0	2356	6.1	157	39.4	962	47.2	1073	7.3	164
Urban	100.0	843	7.9	67	44.3	374	41.6	349	6.2	53
Rural	100.0	1513	5.9	90	38.8	588	47.9	724	7.4	111

Note: *Gomez Classification:*

Normal - Greater than or equal to 90% of NCHS reference median weight-for-age.

Mild (First degree malnutrition) - 75 to 89.9% of NCHS reference median weight-for-age.

Moderate (Second degree malnutrition) - 60 to 74.9% of NCHS reference median weight-for-age.

Severe (Third degree malnutrition) - Less than 60% of NCHS reference median weight-for-age.

F. National descriptions of height-for-age (stunting):

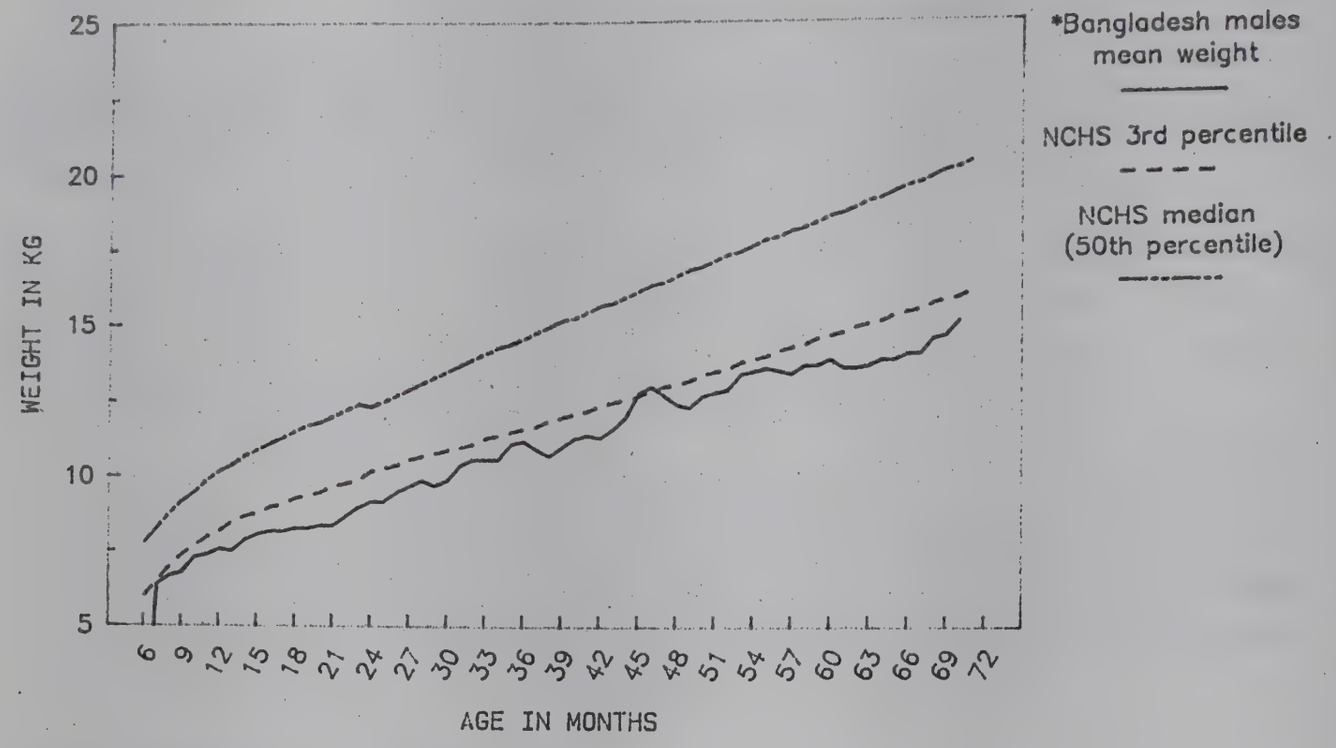
The mean height-for-age of the sample children (unweighted) is 90.3% of the NCHS standard (Table-41). This mean was 89.6 in 1985-86. On average, Bangladesh children 6-71 months of age are not stunted. Average female children 6-71 months of age are stunted in all areas.

Table 41

Mean height-for-age by area and sex

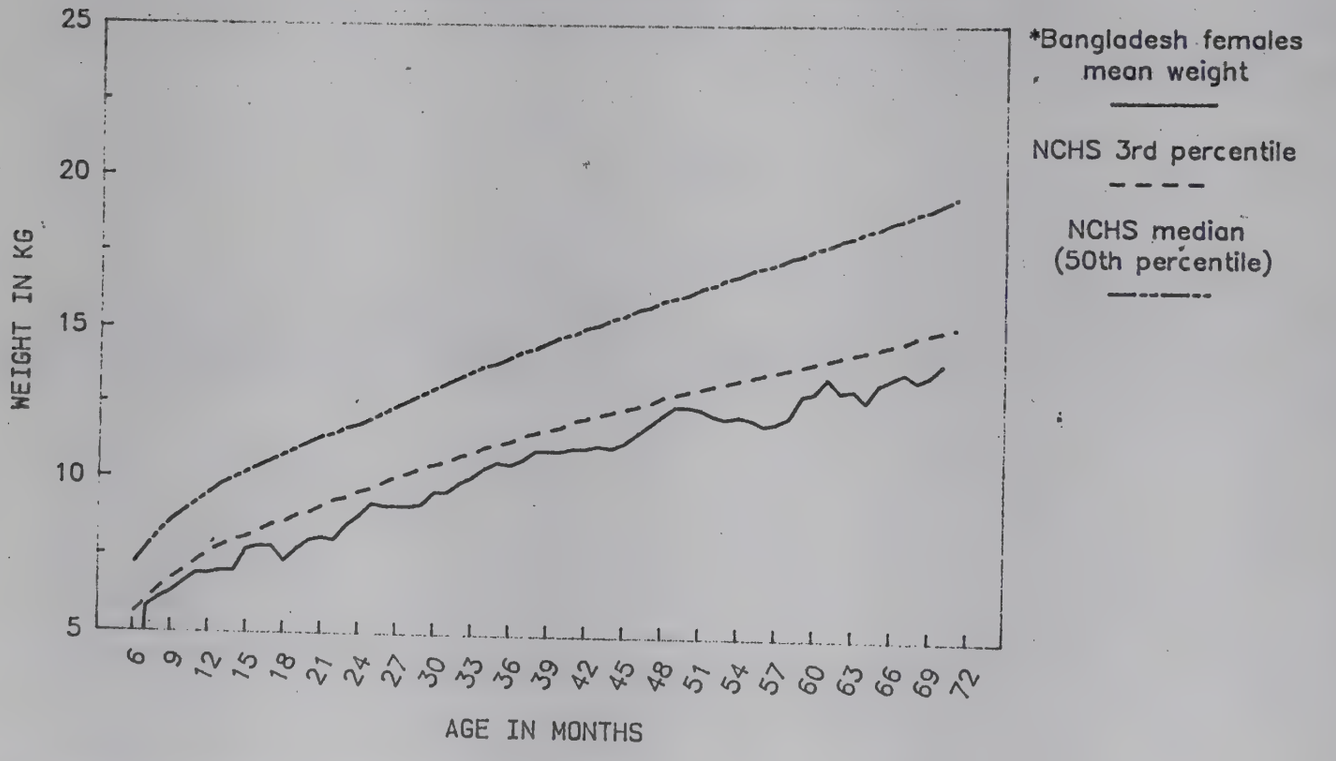
	National		Urban		Rural	
	1985-86	1989-90	1985-86	1989-90	1985-86	1989-90
Total	89.6 ± 5.8	90.3 ± 11.4	90.6 ± 5.7	91.4 ± 17.3	88.8 ± 5.7	89.6 ± 6.0
Male	89.7 ± 5.5	90.7 ± 13.3	90.7 ± 5.4	91.6 ± 17.7	89.0 ± 5.5	89.8 ± 5.9
Female	89.5 ± 6.0	89.3 ± 6.1	90.5 ± 5.9	86.9 ± 5.5	88.6 ± 5.9	89.5 ± 6.1

Graph 0.22 : Distribution of weight by age of male children in comparison with reference standard.


25
20
15
10
5
WEIGHT IN KG
6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 69 72
AGE IN MONTHS
*Bangladesh males mean weight
NCHS 3rd percentile
NCHS median (50th percentile)

* 3 Months weighted moving average

Graph 0.23 : Distribution of weight by age of female children in comparison with reference standard.


25
20
15
10
5
WEIGHT IN KG
6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 69 72
AGE IN MONTHS
*Bangladesh females mean weight
NCHS 3rd percentile
NCHS median (50th percentile)

* 3 Months weighted moving average

Show that the mean heights by age group of males and females fall below the third percentile of NCHS reference standard.

Table 42

Prevalence of stunting by age group area and sex

Age (in months)	Male					Female				
	Urban		Rrural		Percent difference between urban & rural	Urban		Rurla		Percent difference between urban & rural
	weighted percent	Actual No.	weighted percent	Actual No.		weighted percent	Actual No.	weighted percent	Actual No.	
Total	42.5	193	52.0	406	9.5	42.0	163	52.5	383	10.5
6-11	17.1	5	24.7	16	7.9	13.4	4	28.0	18	14.6
12-23	48.0	43	52.1	68	4.1	38.3	18	55.4	75	17.1
24-35	36.4	26	48.5	73	12.1	38.4	31	48.4	69	10.0
36-47	35.7	26	54.5	74	18.8	56.8	47	53.5	78	-3.3
48-59	48.6	39	57.6	83	9.0	41.2	29	54.2	57	13.0
60-71	48.7	54	59.5	92	10.8	44.2	34	63.2	86	19.0

The national prevalence of stunting is found to be 51.1% for children 6-71 months of age. Stunting rates are found to be higher in rural areas in comparison to urban areas (52.2% and 42.3%, Table-1). Urban rural difference is highest in female age group 60-71 months i.e. 19.0.

G. National descriptions of weight-for-height (wasting):

The mean weight-for-height of the sample population (unweighted) in 90.1% of the NCHS median.

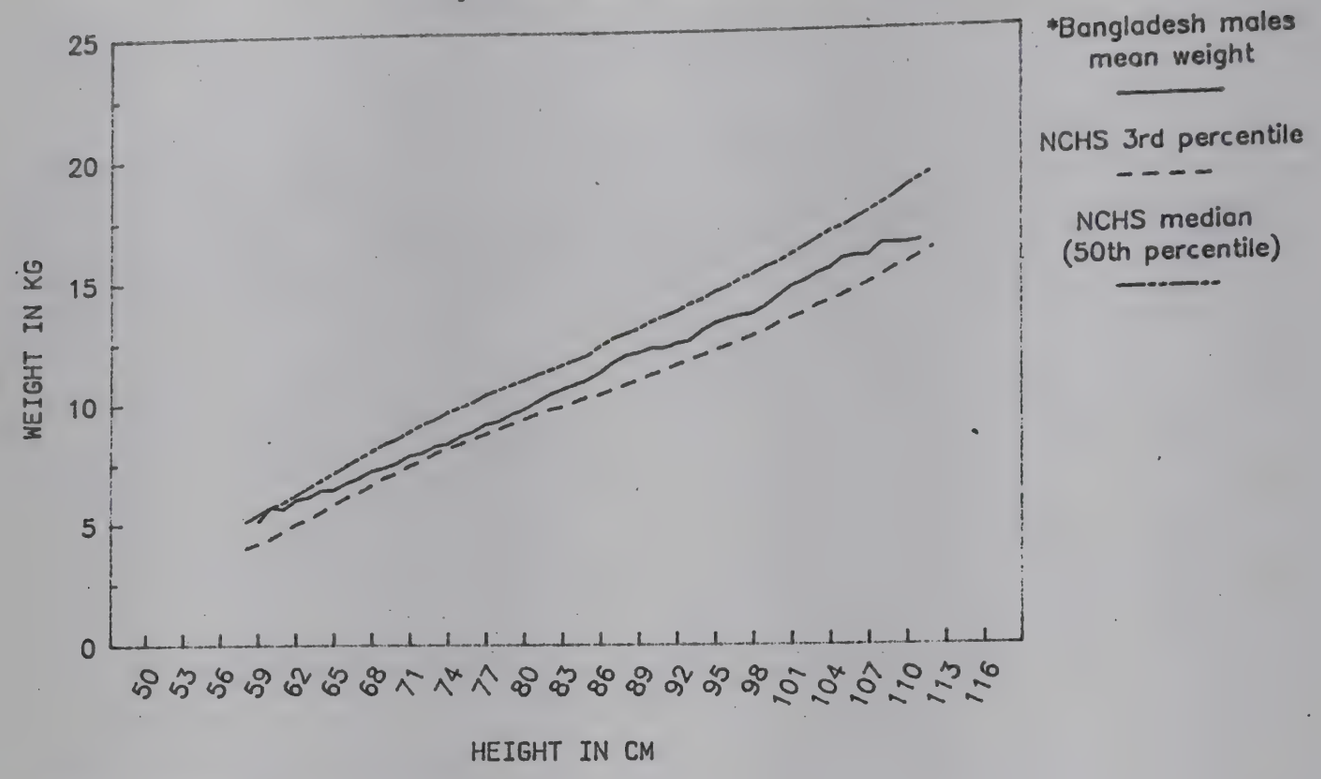
Table 43

Mean weight-for-height by area and sex.

	National		Urban		Rural	
	1985-86	1989-90	1985-86	1989-90	1985-86	1989-90
Total	89.9 ± 7.6	90.1 ± 8.3	90.1 ± 7.6	90.1 ± 7.9	89.7 ± 7.6	90.1 ± 8.6
Male	90.1 ± 7.7	90.0 ± 8.0	90.4 ± 8.0	90.2 ± 7.9	89.9 ± 7.4	89.9 ± 8.0
Female	89.5 ± 7.5	90.3 ± 9.1	89.8 ± 7.1	89.3 ± 6.9	89.4 ± 7.8	90.4 ± 9.2

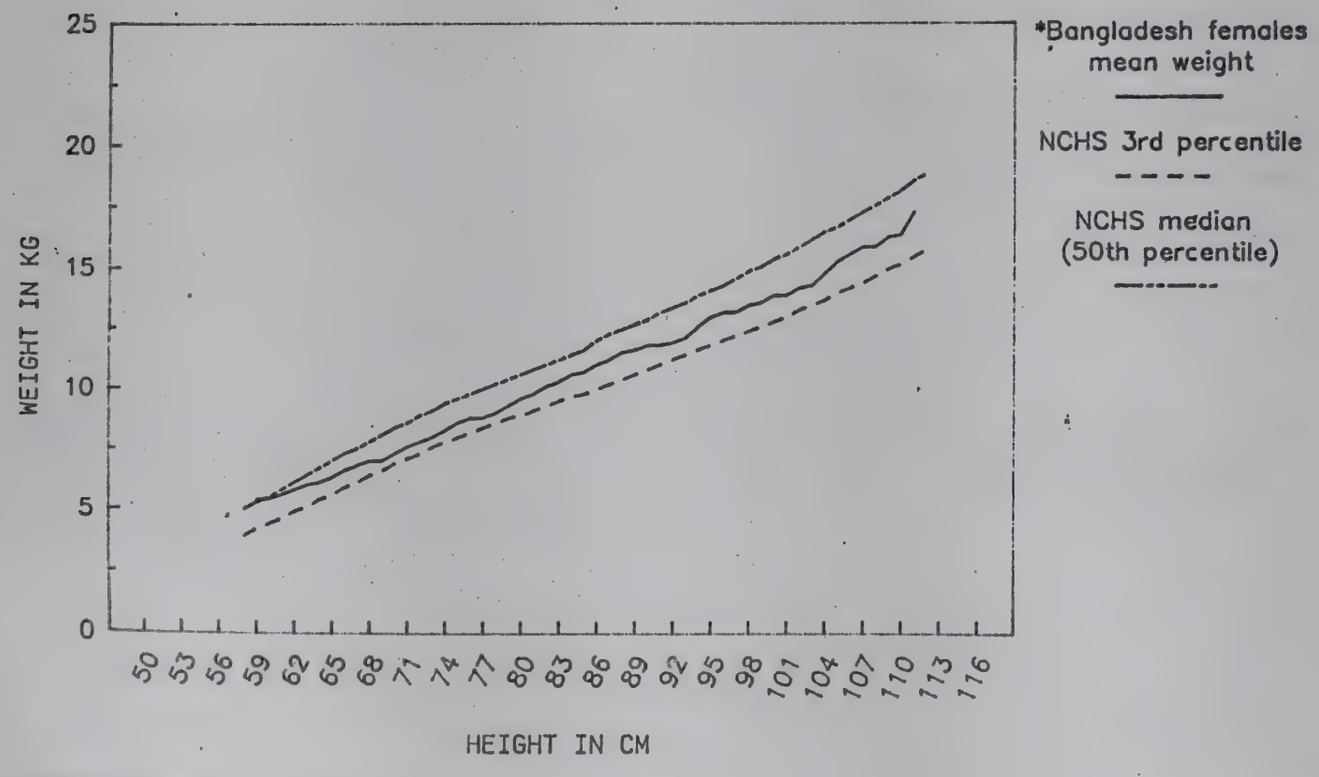
In 1985-86 this mean was 89.9% of the NCHS median. On average, Bangladesh children 6-71 months are not wasted.

Graph 0.24 : Distribution of weight by height of male children in comparison with reference standard.



* 3 Months weighted moving average

Graph 0.25 : Distribution of weight by height of female children in comparison with reference standard.



* 3 Months weighted moving average

Graphs 0.24 and 0.25 show the mean weights of male and female sample children plotted against height.

The national prevalence of wasting is 8.6 (approximately 1.5 million children 6-71 months of age). Which is a bit higher than the national figure of 1985-86 i.e. 8.1. Table-44 shows that prevalence of wasting is higher in rural female children. The highest wasting rate was in the 12-23 months age group with a prevalence of 20.4%.

Table 44

Prevalence of wasting by age group area and sex (1989-90)

Age (In months)	National					Urban					Rural				
	Male		Female		Percent difference between male and female	Male		Female		Percent difference between male and female	Male		Female		Percent difference between male and female
	Weighted percent	Actual No.	Weighted percent	Actual No.		Weighted percent	Actual No.	Weighted percent	Actual No.		Weighted percent	Actual No.	Weighted percent	Actual No.	
Total	8.1	95	9.2	99	1.1	7.0	32	7.6	30	0.6	8.2	63	9.4	69	1.2
6-11	10.6	7	8.7	9	1.9	-	-	14.0	4	14.0	11.7	7	8.1	5	3.6
12-23	15.1	31	19.9	35	4.8	12.5	11	14.5	7	2.0	15.5	20	20.4	28	4.9
24-35	8.2	18	10.5	21	2.3	8.7	6	6.0	5	2.7	8.2	12	11.2	16	3.0
36-47	6.2	12	5.7	13	0.5	4.0	3	5.9	5	1.9	6.5	9	5.6	8	0.9
48-59	4.6	11	3.5	9	1.1	6.3	5	8.7	6	2.4	4.3	6	2.7	3	1.6
60-71	5.8	16	6.3	12	0.5	5.9	7	3.6	3	2.3	5.8	9	6.6	9	0.8

6.9 Nutritional status results by selected HES variables.

Nutritional status variables were derived from Six HES variables, household income, household expenditure, household expenditure on food, household expenditure on medical care, occupation of the head of the household and total land owned by the head. These derived variables are analyzed by nutritional status. Some of the tables are shown in Appendix F.

SECTION 7

MULTIVARIATE ANALYSIS OF NUTRITION STATUS

A. Methodology

Selected economic variables were transferred from the HES questionnaire to the Nutrition Survey questionnaire at the BBS. This allows analysis of nutrition status with changing socio-economic situation of households. To examine the relationships, Z-scores are used as the dependent variable to indicate the nutrition status of children. Independent variables were included from a list of relevant variables derived from both the Nutrition and HE surveys.

Because, nutritional status of children is affected by so many economic, social, environmental, maternal and child-specific variables, it is difficult to explain a large proportion of variability with a limited set of variables. Moreover, the interactions of different variables are quite complex and a simple bivariate analysis may lead to inappropriate policy conclusions. To be able to control for other relevant variables, it was decided to use a simple multivariate regression model.

B. Variables included

The following variables were incorporated in the regressions for the analysis of determinants of nutrition status.

1Age of the child in months (AGED)
Square of age (SQAGE)
Income per capita (INCPCAP)
Expenditure per capita (EXPPCAP)

Table 45

Health Practices, Vegetable Gardening and Nutrition Status of Children
(1989-90 Nutrition Survey)

	Height-for-age		Weight-for-age		Weight-for-height		
	Severe	Moderate	Severe	Moderate	Severe	Moderate	Total
Taken vitamin A capsule during last 6 months ?							
Yes	37.6	30.1	28.2	39.1	0.6	14.0	42.0
No	34.3	30.4	24.8	40.7	2.1	12.6	57.5
Household use iodized salt ?							
Yes	26.9	14.2	17.5	26.7	-	7.6	0.7
No	35.3	30.1	26.0	40.0	1.5	13.2	97.8
Don't know	52.0	44.5	37.2	51.7	3.7	7.5	1.5
Any member of household knows how to prepare ORS ?							
Yes	33.3	31.7	24.9	39.7	1.4	12.9	59.8
No	38.8	28.0	28.0	40.7	1.6	13.3	40.2

Table 45 (Continued)

Health Practices, Vegetable Gardening and Nutrition Status of Children
(1989-90 Nutrition Survey)

	Height-for-age		Weight-for-age		Weight-for-height		
	Severe	Moderate	Severe	Moderate	Severe	Moderate	Total
Consume vegetables produced by the household ?							
Yes	35.5	30.1	25.6	40.4	1.4	13.1	75.5
No	35.8	30.7	28.1	39.4	1.6	13.1	24.3
Percent of total vegetable consumption from own production							
Zero	35.8	30.7	28.1	39.4	1.6	13.1	24.3
100%	32.2	26.6	25.5	42.8	5.2	17.0	1.1
>50%	38.8	28.0	27.1	38.8	1.5	12.5	28.8
<50%	33.3	31.8	23.7	41.9	1.1	13.1	41.5
Any health workers visited the household during last 6 months							
Yes	36.2	30.8	26.0	40.1	1.1	12.6	73.2
No	33.8	28.6	26.5	40.1	2.6	14.6	26.8

Medical expenditure per capita (MEDPCAP)
Square of expenditure (SQEXP)

DUMMY VARIABLES

Diarrhoea, last three months Yes DIARR=1
Diarrhoea, last two weeks, Yes DIAR2WK=1
Fever, cough, last 2 wks: Yes FFV=1
Measles, last 3 months: Yes MEAS=1
Male Yes SEX=1
Education 1 to 5th grade PRIMARY=1
Education above primary SECOND=1
Source of water, tubewell or tap DWATER=1
Toilet type, Sanitary or flush SANIT=1
Breast-feeding duration less than 6 months D1BRSF=1
Breast-feeding duration 6 to 12 months D2BRSF=1
First solid food introduced before 6 months DSOLID=1
First solid food introduced between 6-12 DSOLID2=1
First solid food introduced after 12 mo DSOLID3=1
Quarter 1 (Jan-March) QTR1=1
Quarter 2 (April-June) QTR2=1
Quarter 3 (July-Sept) QTR3=1
Rural area DREGION=1
Know how to prepare ORS ? Yes, KNOWORS=1

C. Results

Tables 46-49 report the regression results for four anthropometric indicators used in this report. As mentioned earlier, these indicators reflect different types of malnutrition with significantly different processes of development.

In the regressions, the Z-scores are expressed in percent i.e., -2 SD is expressed as -200. The MUAC is expressed in millimeters. The t-statistics for each of the variables included in the regression model are also reported. A negative value for the estimated coefficient of a variable implies that the variable lowers the Z-score of children and vice-versa.

Table 46 shows the regression result for MUAC. The MUAC is related with AGE and SQAGE. As age increases, MUAC increases although at a declining rate due to negative coefficient of SQAGE. It is interesting to not that if there is more than one child in the household, the age difference of the two consecutive children influence the MUAC as well. The coefficient for AGEDEF is positive, implying that higher age difference is associated with the nutrition status of the child. Male children, on the average (controlling for other variables), have higher MUAC than female children. Source of drinking water, if the source is likely to provide clean water for the household, improves the MUAC of children. Use of sanitary latrines have important positive impact on MUAC after controlling for the economic position of households. Knowledge of ORS preparations also tend to improve the MUAC of the children.

Table 46

Multiple Regression Results with MUAC as Dependent Variable
(1989-90 Nutrition Survey)

Variable	Coefficient	t-Statistics	
AGED	.48798	7.666	*
AGEDSQ	-3.32562E-03	-4.423	*
AGEDEF	.02574	2.310	*
D1BRSF	2.43719	1.515	
D2BRSF	.93585	1.125	
DSOLID	-1.50571	-.969	
DSOLID2	-2.08813	-1.345	
DSOLID3	-1.84732	-1.061	
KNOWORS	.72186	1.606	
DIAR2WK	-1.37030	-1.412	
DIARR	-2.11607	-2.763	*
MEAS	-1.26252	-1.575	
FEV	-2.27730	-4.524	*
DWATER	1.51259	2.028	*
DSANIT	2.25092	3.263	*
SEX	2.29468	5.414	*

Table 46 (Continued)

Multiple Regression Results with MUAC as Dependent Variable
(1989-90 Nutrition Survey)

Variable	Coefficient	t-Statistics	
QTR1	-1.53510	-2.528	*
QTR2	-1.21630	-1.851	
QTR3	.57048	.888	
EXPPCAP	.59644	3.018	*
SQEXP	-.01446	-1.474	
PRIMARY	1.34714	1.912	
SECOND	3.02052	3.622	*
DREGION	-.55430	-1.074	
(constant)	122.93281	57.753	

*R-square = 0.27, F=33.67 * Significant at .05 level*
Note: See text for the definition of the variables.
Some of the coefficients reported in the table are not statistically significant.

Mother's educational status, controlling for the age of children and income of households, shows significant impact on MUAC. On the average, primary education tends to increase the MUAC by 1.35 mm and more than 5 years of education by more than 3 mm compared to the MUAC of children belonging to illiterate mothers.

Household expenditure per capita is also associated with the MUAC, i.e., economic position of households improve the nutrition status of children. SQEXP show a negative sign, implying that the rate of increase of MUAC with the increase in economic position is greatest at the lower level of income. However, SQEXP is significant at only 14 percent level.

Mean MUAC, controlling for other variables, appear to be lowest during the first quarter (June-July) and slightly improves during the second quarter (Aug-Sept). The MUAC appears to be higher in other two quarters than the first or second quarter.

Prevalence of childhood diseases also affects the nutrition status measured by MUAC of children. Incidence of fever during the last two weeks or diarrhoea during the last three months reduce the MUAC significantly. Diarrhoea during the last two weeks and Measles both have negative coefficients but they are not significant at 5 percent level or better. Frequency of diarrhoeal attack during the last three months have no impact at all on MUAC. Duration of breast-feeding or the age.

Table 47 reports the results using height-for-age as the dependent variable. Age of the child lowers the height-for-age Z-scores but square of the age has a positive coefficient. Therefore, the relationship between age and height-for-age Z-score is a non-linear one with a declining tendency for the whole age range. However, the rate of decline of nutrition status is much faster for the younger children and gradually becomes lower as age increases.

Household expenditure per capita was included as an independent variable to see the impact of income and economic status of households. Expenditure data are often more reliable than income data. Also, if services from

durable goods are included, it is a better indicator of long-run economic position of household (permanent income) than income. The estimated coefficients indicate that expenditure per capita also have a non-linear relationship with the Z-scores. At low levels of expenditure, small increase in expenditures have relatively higher impact on nutrition status. For example, an increase from Tk. 1000 to Tk. 1,500 per capita (US dollar 29 to 43) per year increases the Z-score by about 5 points. Due to the negative coefficient of the SQEXP, the impact of expenditure on theHeight-for-age Z-scores decline with increasing expenditure per capita.

Table 47
Multiple Regression Results with HFAZ as Dependent Variable
(1989-90 Nutrition Survey)

Variable	Coefficient	t-Statistics	
AGED	-3.60943	-4.034	*
AGESQ	.02970	2.810	*
AGEDEF	.37484	2.393	*
D1BRSF	-31.07293	-1.374	
D2BRSF	18.92244	1.618	
DSOLID	-3.67475	-.168	
DSOLID2	10.33753	.474	
DSOLID3	2.10461	.086	
KNOWORS	12.82850	2.030	*
DIARR	-18.22110	-1.693	
DIAR2WK	-15.83846	-1.161	
FREQ	1.25003	.191	
MEAS	-3.40607	-.302	
FEV	-17.25132	-2.438	*
DWATER	6.60425	.630	
DSANIT	39.17079	4.040	*
SEX	8.60302	1.444	
QTR1	35.98899	4.217	*
QTR2	6.87080	.744	
QTR3	30.10639	3.334	*
EXPPCAP	9.32301	3.356	*
SQEXP	-.23545	-1.707	
PRIMARY	14.30477	1.445	
SECOND	41.71660	3.559	*
DREGION	-9.82502	-1.354	
(constant)	-261.63954	-8.744	*

*R-square = 0.09 F=9.29 * = Significant at .05 level*
Note: See text for the definition of the variables.
Some of the coefficients reported in the table are not statistically significant.

Knowledge of ORS preparation improves the Z-score by more than 12 points on the average. A child who reported at least one attack of diarrhoea during the last six months are worse-off than others in terms of HFAZ. Incidence of fever also reduces the HFAZ of children. However, measles and frequency of diarrhoea had no impact on the indicator. Use of water from sources considered safe also have no significant impact on HFAZ but sanitary latrines significantly affect the nutrition status of children. AGEDEF is also found to be significant in this multiple regression model.

The coefficients also indicate that the nutrition status of children who were breast-fed for more than 6 months (but less than 12 months) are better-off than other children. The age of the child when the first solid food was introduced show no impact at all on HFAZ. Regional and gender differences are also found to be insignificant if we control for other independent variables. The coefficients for both PRIMARY and SECOND is positive but the t-statistics for PRIMARY is quite low. However, the variable SECOND is highly significant, implying that the HFAZ of children improves significantly if the mother has more than five years of schooling.

Table 48 reports the estimated coefficients for weight-for-age Z-scores. The non-linear relationship between expenditure per capita and the Z-scores observed for height-for-age is also true for weight-for-age. Education level of mothers, dummy variables for diarrhoea and fever are found to be important in determining the weight-for-age Z-scores of children. Children who were breast-fed for 6 to 12 months are better-off by this indicator. Source of water shows no improving effect but toilet type remains highly significant.

Table 49 shows the results for weight-for-height Z-scores. Expenditure per capita has very little impact on wasting; the coefficient being significant at only 10 percent level. Education of mother shows no impact on the nutrition status of children measured by WFHZ. Respiratory infections or fever tend to reduce the Z-score. Children who were breast-fed 6 to 12 months were significantly better-off than children with more than 12 months or less than 6 months of breast-feeding. Other solid food introduced before the age of six months appears to have a small positive impact on the dependent variable. Toilet type or source of water was not significant in determining the weight-for-height Z-scores of children. Impact of seasonality is clear from the coefficients of QTR variables.

TABLE 48

Multiple Regression Results with WFAZ as Dependent Variable
(1989-90 Nutrition Survey)

Variable	Coefficient	t-Statistics	
AGED	-.31836	-.528	
AGESQ	1.149647E-03	.161	
AGEDEF	.29302	2.776	*
D1BRSF	-14.40611	-.945	
D2BRSF	20.63668	2.618	*
DSOLID	-23.97347	-1.628	
DSOLID2	-20.98796	-1.427	
DSOLID3	-20.32073	-1.232	
KNOWORS	8.14857	1.913	
DIARR	-13.36989	-1.843	
DIAR2WK	-12.62318	-1.373	
FREQ	-2.97686	-.676	
MEAS	-5.81101	-.765	
FEV	-19.82445	-4.157	*
DWATER	5.59277	.792	
DSANIT	23.38553	3.579	*
SEX	7.00203	1.744	
QTR1	-8.90981	-1.549	
QTR2	-12.35059	-1.984	*
QTR3	3.15450	.518	
EXPPCAP	6.49506	3.470	*
SQEXP	--.17052	-1.835	
PRIMARY	11.39550	1.708	
SECOND	31.58391	3.998	*
DREGION	-10.14437	-2.074	*
(constant)	-251.23801	-12.459	*

*R-square = 0.09, F=8.57 * Significant at .05*
Note: See text for the definition of the variables.
Some of the coefficients reported in the table are not statistically significant.

TABLE 49

Multiple Regression Results with HFWZ as Dependent Variable
(1989-90 Nutrition Survey)

Variable	Coefficient	t-Statistics	
AGED	.98003	1.770	
AGESQ	-9.70377E-03	-1.484	
AGEDEF	.13042	1.345	
D1BRSF	.66895	.048	
D2BRSF	28.82619	3.982	*
DSOLID	-41.29773	-3.055	*
DSOLID2	-48.75826	-3.609	*
DSOLID3	-40.07548	-2.647	*
KNOWORS	1.70975	.437	
DIARR	-3.47777	-.522	
DIAR2WK	-4.73833	-.561	
FREQ	-6.64830	-1.645	
MEAS	-11.29621	-1.620	
FEV	-15.27164	-3.487	*
DWATER	-.33892	-.052	
DSANIT	4.92593	.821	
SEX	-3.52058	-.955	
QTR1	-42.64944	-8.075	*
QTR2	-26.76610	-4.683	*
QTR3	-21.57810	-3.862	*
EXPPCAP	2.68849	1.564	
SQEXP	-.08983	-1.053	
PRIMARY	1.36126	.222	
SECOND	7.69166	1.060	
DREGION	-7.40899	-1.650	
(constant)	-76.08820	-4.109	*

*R-square = 0.07, F=6.45 * — Significant at .05*
Note: See text for the definition of the variables.
Some of the coefficients reported in the table are not statistically significant.

CONCLUSIONS AND POLICY IMPLICATIONS

All seven anthropometric indicators estimated for children of age 6 to 71 months indicate high prevalence of malnutrition in Bangladesh. More than a third of all children of age 6-71 months were found to be stunted and about a quarter were severely underweight. According to this 1989-90 survey, prevalence of stunting, underweight and wasting for children in Bangladesh are 65, 66 and 15 percent respectively if we use -2 Z-score as the cut-off point. Using percent of reference median cut-off points, the rates are 50, 72 and 10 percent respectively. By international standards, these are extremely high malnutrition rates (see Carlson, Wardlaw 1990; table 3).

In general, rural areas show higher prevalence of malnutrition than urban areas. Many economic, social and environmental factors can explain this rural-urban differences. For example, mean income of rural households are lower with poorer environmental conditions. Sex differences in malnutrition rates are not significant for most of the indicators estimated.

Age of the child also appears important in determining nutrition status of children. For example, arm circumference is strongly related with the age variable. In fact, the relationship is so consistent and strong that one can question the usefulness of the indicator as a measure of malnutrition when arm circumference consistently increase with age. However, the regression results suggest that variables other than the age of the child influence MUAC as well. Stunting, wasting and underweight also tend to increase with age at the initial stage and become more or less constant or even decline for older children. Some important policy implications of the 1989-90 nutrition survey results are discussed below.

Expenditure or income of the household was found to be an important determinant of nutrition status of children supporting the well established result that economic growth and development will improve the nutrition situation. The rate of improvement in nutritional status due to increase in income is much larger at lower levels of income. Therefore, targeting income-generating activities towards the poorest will improve the nutritional situation at a much faster rate than a policy of general economic expansion.

Nutritional status of children gradually worsens after the age of six months. From the age-specific prevalence rates, it appears that children of age 12 to 40 months should receive priority in nutrition programs.

Rural areas show higher rates of malnutrition than urban areas. The absolute size of the malnourished children is also much larger in rural areas. This implies targeting the rural areas for nutrition programmes. It should be noted that urban slums were not defined as a separate stratum in the surveys and some urban slums could be worse-off than the rural areas.

Male children are slightly better-off than the female in terms of prevalence of malnutrition. The difference between the sexes is not large enough to justify a targeted program for female children.

Education level of mothers has a strong positive impact on the nutrition status of children. Even two to three years of schooling tends to improve the child's nutritional status. Secondary education has additional positive effect. Thus, nutrition situation of children can be improved through a policy which encourages womens' participation in schools and literacy programs.

According to the 1985-86 and 1989-90 nutrition surveys, prevalence of wasting was lowest during January to March and highest during April and August. Short term seasonal nutrition intervention programs can be implemented during the high malnutrition prevalence months.

Prevalence of diseases like diarrhoea, respiratory infection, fever and measles adversely affect the nutrition status of children. Efforts to control the incidence and severity of these diseases should improve the nutrition status of children.

Duration of breast-feeding between 6 to 12 months is associated with a better nutritional status as compared to children breast-fed for more than 12 months or less than 6 months. Age when first solid food is introduced has a strong impact on nutrition status of children. Children who are exclusively breast-fed at the time of the survey were better-off in terms of their nutritional status than children who already had their first solid food. Among three categories defined for age when the solid food was introduced, the third (after 12 months of age) and first (less than 6 months) category imply slightly better nutrition status of children than the second category. It is not clear why the introduction of solid food during age 6 to 12 months should have higher prevalence of short-terms malnutrition than other categories.

Source of drinking water has no statistically significant impact on nutrition status. Most households use tubewell as the source of their drinking water. Although, the source of water by itself may not be an important determinant of nutrition status, it can interact with sanitation facility and incidence of diarrhoea.

Better sanitation facility, controlling for the income of the household, has a significant impact on child nutrition status. Nutrition status of children belonging to households with flush or sanitary toilet facility was found to be significantly better. Improving environmental sanitation should improve nutrition status. Clearly, the effect of environmental sanitation on nutrition is an indirect one through water supply quality and incidence of infections.

DEFINITIONS

Age in completed months: Age of the child defined in whole months by truncating fraction of a month. Therefore, a child of age 6.9 months will become 6 in completed months.

Age calculations with missing day of birth: If the year and month of birth is known, the missing date, coded as zero in the survey, was converted into 15 to calculate the age of the child.

Anthropometry: The technique that deals with the measurement of the size, weight and proportions of a human body.

Anthropometric assessment: refers to the use of anthropometry to provide estimates of the prevalence and severity of malnutrition in a community.

Arm circumference Tape: The tape used to measure mid-upper arm circumference, graduated in 0.1 CM or in three sections of different colours.

Breast-feeding: A child is considered breast-fed if he or she is offered breast at least once in the past few days.

Diarrhoea: At least three loose stools in one day.

Enumerator: The interviewer who collects survey data and took anthropometric measurement.

Gomez classification: A classification scheme to define different degrees of malnutrition using percent of reference median for weight-for-age indicator. Gomez classification defines four degrees of malnutrition: severe, moderate, mild and normal.

Hanging Scale: A light weight, durable scale which can be easily set up in the field by hanging it from a strong overhead beam or a branch of a tree. The scale is graduated in 0.1 kg.

Height/Stature: Distance from the crown of the head to the bottom of the feet (heels) while the child is measured standing. Height or stature is measured for children two years of age or older.

Height Measuring Board: A measuring board that can be used to measure either standing height or recumbent length. The board is graduated in 0.1 CM.

HES: Household Expenditure Survey, a national level survey conducted by the Bangladesh Bureau of Statistics, to collect data on income and expenditure of households.

Household: A dwelling unit where people live together and have their meals from a common cooking arrangement.

Household head: The principal decision maker of the household. A member of the household is treated as head whom other members deem to be so. Generally, the eldest male or female earner of the household member is considered to be the head of the household.

Income: Material return in kind or cash earned in exchange for goods and services by the household members is defined as household income.

Length: Distance from the crown of the head to the bottom of the feet (heels) while the child is measured supine. This method of measurement is used for children less than two years of age.

Mid-Upper Arm Circumference (MUAC): The measurement of a child's arm circumference at the mid-point between the tip of the shoulder and elbow joint.

Percent of reference median: Cut-off points defined to classify the observed values of height-for-age, weight-for-age or weight-for-height in terms of percent of reference median value.

PSU: Primary sampling unit.

Reference: The reference is a device for grouping and analyzing data. In principle, it does not matter what set of reference data is used, provided that it is large enough to contain adequate statistical information and the population is reasonably healthy and well nourished to avoid major distortions. For comparative purposes, it is desirable to use a common reference. The NCHS population has been accepted by WHO as reference for international use.

Rural area: All areas excluding the paurashavas and municipal areas is defined as rural.

Survey Child: A child of age 6.0 months to 71.9 months belonging to the sub-sample of HES households drawn for the nutrition survey.

Stunted or chronic Malnutrition: Stunting is a slowing of skeletal growth and of stature relative to the stature in a reference child of same age.

Underweight: Underweight is a condition of lower than expected tissue and fat mass relative to the amount in a child (mean or median child of reference population) of same age.

Urban area: All metropolitan cities, municipal areas and paurashavas are defined as urban area.

Wasted or Acute Malnutrition: Wasting is a condition expressed by a deficit in tissue and fat mass relative to the amount in a child of same height or recumbent length. Degree of wasting can be defined using Z-score categories or percentile location or percent of reference median categories for weight-for-height.

Weight: Measurement of a child's total body mass undressed or lightly dressed.

Weighted percentage: The survey over-sampled the urban areas to allow estimation of nutrition indicators for the region. To derive the national level statistics, the rural and urban samples should be weighted using the appropriate national multipliers for the sample. Percentages estimated using the weights are termed as weighted percentage.

Z-scores: The gap between the observed values of nutritional status indicators and the mean of the reference distribution expressed in reference distribution standard deviation units.

ESTIMATING RURAL-URBAN WEIGHTS

In this report, weights were calculated for rural and urban areas for each of the four divisions of the country. The method of estimating the weights is as follows:

The estimate of number of households (HH) in January 1989 were obtained by rural and urban areas for each of the four divisions. If the number of households in Child Nutrition Survey is CH and if only CN of the households had atleast one survey child, the probability that a household will have atleast one survey child can be approximated as: CN/CH. Therefore, for the region as a whole, we can expect to find about (HH)* (CN/CH) households with atleast one survey child. If the number of households actually surveyed by the nutrition survey is CS, the weight for the region should be: Weight = [(HH) * (CN/CH]/CS.

For example, weight for urban areas of Dhaka division was estimated in table C1 using the following procedure.

Total households in urban Dhaka = 1071545

Total households in nutrition survey = 494

Households with atleast one survey child in the sample = 284

Therefore, probability that a household will have atleast one child in urban Dhaka = (284/494) = 0.574899

Expected number of households in urban Dhaka with atleast one survey child = (1071545* 0.574899) = 616030

Households actually surveyed in urban Dhaka by the nutrition survey = 241

Weighting factor for urban Dhaka = (616030/241) = 2556.14

The weighting factors estimated using the above approach assumes that the rural-urban ratio of sample size remains more or less constant over the four quarters of the survey. However, the ratio of rural to urban households surveyed varied significantly over the quarters. For example, the ratio in quarter 2 was only 1.287 while in quarter 4 it was 2.387. If we use the weights estimated by the above process, data from rural areas will get a higher weight in quarter 4 than in quarter 2. In other words, quarter specific prevalence rates will reflect not only the seasonality of malnutrition but also the differential ratio of rural-urban sample sizes. Therefore, the weighting factors must be corrected for the differential rural-urban ratio of sample sizes. The sample size in rural and urban areas of a division by quarter is often too small to derive statistically acceptable correction factors.

To derive quarter specific correction factors, the rural-urban sample size ratio (NR) is calculated for the nutrition survey. If the ratio for quarter 1 is QR, the correction factor is defined as (QR/NR). The rural weights for all divisions were divided by this correction factor to derive the national level statistics for the quarter. All other quarter specific data were also corrected using the method.

Table B1

Weights or Raising Factors for 1989-90 Nutrition Survey

Area	Number of Households	HHs in Nut. sur	HHs with one child	HHs surveyed	Weights
Dhaka Division					
Urban	1071545	494	284	241	2556.14
Rural	4792953	555	338	302	9665.40
Chittagong Division					
Urban	567276	284	161	135	2382.14
Rural	4170479	460	304	269	10245.88
Rajshahi Division					
Urban	322566	191	94	79	2009.49
Rural	4315005	541	310	264	9365.73
Khulna Division					
Urban	395757	232	131	108	2069.13
Rural	3179426	328	190	157	11730.83
TOTAL URBAN	2357144	1201	670	563	2335.66
TOTAL RURAL	16457863	1884	1142	992	10056.50

SAMPLE DESIGN

A note on the Integrated Multipurpose Sample (IMPS):

Introduction

Since 1980 the BBS has been conducting household surveys, using common PSUs (Primary Sampling Units), which have recently been incorporated in the Household Survey Capability Programme of the United Nations.

The present objective of the programme is to conduct the following sample surveys to meet provide household based statistics in the areas of:

a) Household expenditure
b) Child nutrition
c) Labour force
d) Demography
e) Education and health statistics.

Integrated Multipurpose Sample of Primary Sampling Units

In the continued and regular survey programme there are definite advantages in having a IMPS. The "IMPS" consists of randomly selected areas within which households are ultimately selected for the various surveys to be conducted. Each survey does not use the same sample of households; rather, due to different sample size requirements for the various surveys different samples of households have been selected from the given set of selected PSUs.

Definition of a PSU

Usually in urban area mahallas and mauzas in rural areas mouzas are considered as PSUs. Each PSU has 250 to 300 households.

Selection of PSUs

Entire Bangladesh, excluding Chittagong H.T. , Khagrachari, Bandarban, constitutes the Universe for the sample. 360 PSUs were selected from 61 districts. 120 PSUs are from urban areas and 240 PSUs from rural areas. The four major strata are as follows:

Stratum 1	-	SMAs (Statistical Metropoliton Area)
Stratum 2	-	IMPS Paurashavas (Municipality)
Stratum 3	-	Other Paurashavas
Stratum 4	-	All other areas (to be called rural).

The 120 urban PSUs will be allocated to strata 1, 2 and 3 and the 240 rural PSUs to stratum 4. In strata 1 to 3, the units may be paurashavas or parts of SMAs. In allocating PSUs to substrata, if will be a requirement that at least 2 PSUs be allocated to every substratum. Two other criteria to be followed in forming substrata are,

a. The number of PSUs per substratum should be kept small, usually 5 or fewer.
b. The preliminary fractional allocation of PSUs to substrata should have values that are fairly close to integers, so that the substratum khana count divided by the number of PSUs allocated will not vary widely within a stratum.

16 Households were selected randomly from each of the PSUs for the Household Expenditure Survey of 1988-89.

Child Nutrition Module of 1989 is based on a sub-sample of about 50 percent of 1988-89 HES. A sample of 196 PSUs (77 urban PSUs and 119 rural PSUs) were selected from 360 PSUs. The selection followed the criteria that at least two PSUs will be from each substrata. Thus 196 PSUs were selected instead of 180 PSUs.

Approximately 45 PSUs were covered in each quarter. Out of 3085 households 1812 households were expected to have survey children. 1555 households actually had survey child and are interviewed.

List of PSU's Surveyed by Quarter
First Quarter June 7, 1989 to June 21, 1989

District	Upazila/Thana	Mauza/Mahalla (PSU)	Household covered HES	CNS	Urban/ Rural
Sylhet	Kotwali	Purba Kazir Bazar	16	6	U
Sariatpur	Palong	Arigaon	16	9	U
Pancha ghar	Pancha ghar	Duri kamari	16	8	U
Narayangonj	Siddir gonj	Khorda gash para	16	9	U
Naogaon	Naogaon	Master para	15	6	U
Mymensingh	Kotwali	Natak ghar lane	16	9	U
Manikgonj	Manikgonj	Malacha, Raintha	16	7	U
Khulna	Khulna	Sonadanga N. Market	14	7	U
Khulna	Daulatpur	Panigati (Daghalia)	16	8	U
Gaibanda	Gaibanda	Purba Bridge, Baro Barivora	16	6	U
Faridpur	Kotwali	Dakshin tepakhola	15	10	U
Dhaka	Sutrapur	Pustagala	13	6	U
Dhaka	Demra	Dakshin Gop	14	12	U
Dhaka	Mohammadpur	Samali (purbo)	16	8	U
Dhaka	Lalbag	Rajnarayandhar road	16	11	U
Dhaka	Karanigonj	Char ragunath pur	16	5	U
Dhaka	Ramna	Hazi para (part)	14	6	U
Chuadanga	Chuadanga	Maszidpara	16	7	U
Chittagong	Chittagong Port	Uttar Patenga	16	5	U
Chittagong	Double Mooring	Dakshin Agrabad	16	5	U
Sylhet	Kotwali	Khararia	16	11	R
Rangpur	Mitha pukur	Tetulia	16	10	R
Rangpur	Badargonj	Grilai	16	9	R
Rajshahi	Charghat	Gua Bassina	16	9	R
Patuakhali	Golachipa	Golachipa	16	8	R
Pirojpur	Swarupkati	Paitkal Bari	16	6	R
Pirojpur	Nazirpur	Baraibunia	16	7	R
Panchaghar	Boda	Khariza Magura	16	7	R
Pabna	Santhia	Rupusi, Mandor gati	16	11	R
Noakhali	Sudharam	Sahzadpur	16	8	R
Netrokona	Kalma Kanda	Choto Kriahnapur, Roghunathpur	15	8	R
Natore	Lalpur	Naodara	16	9	R
Narsingdi	Narsingdi	Anandi, Talarpara	15	12	R
Narayangonj	Araihazar	Ulukanda	16	11	R
Narail	Golachipa	Peruli	16	7	R
Naogaon	Manda	Chotta belaidaha	16	7	R
Mymensingh	Gouripur	Takpur, Kamarpara	16	13	R
Maulavi Bazar	Kulaura	Chandgaon	16	8	R
Manikgonj	Ghior	Goaldangi	16	6	R
Laksmipur	Ramgonj	Mukterpur, Hapenia	16	10	R
Kushtia	Daulatpur	Char Slimpur	15	10	R
Jhenaidha	Moheshpur	Jadabpur	16	8	R
Habiganj	Nabigonj	Chattak	16	12	R
Goalanda	Goalanda Ghat	Dakshin ujan char	16	8	R

District	Upazila/Thana	Mauza/Mahalla (PSU)	Household covered HES	CNS	Urban/ Rural
Faridpur	Boalmari	Murardia	16	10	R
Dinajpur	Ghoraghat	Bancemuri G.pur	16	8	R
Cox's Bazar	Cox's Bazar	Totak khali	16	10	R
Comilla	Murad Nagar	Andikot	15	9	R
Chittagong	Chandanish	Kulal danga	16	7	R
Chittagong	Satkania	Purba Galiadanga	16	12	R
Chandpur	Motalab	Bara Ani, Sikir Char	16	12	R
Bhola	Bhola	Char pangashia	16	10	R
Total (First quarter)			817	443	52
Urban			309	150	20
Rural			508	293	32

List of PSUs Surveyed by Quarter
Second Quarter: August 8, 1989 to Augst 22, 1989

District	Upazila/Thana	Mauza/Mahalla (PSU)	Household covered HES	CNS	Urban/ Rural
Serajgonj	Serajgonj	Hassanpur	16	7	U
Narayangonj	Bandar	Champatali	16	10	U
Mymensingh	Kotwali	Kabarstan Road	16	7	U
Khulna	Daulatpur	Moharaja Road Purba boyra	16	6	U
Jhalokati	Nalchiti	Parampasha, suraipasha	16	8	U
Dinajpur	Parbatipur	Dekhinpara, Haldibari	16	8	U
Dhaka	Motijheel	Railway colony	11	4	U
Dhaka	Lalbag	Haslai	16	10	U
Dhaka	Tejgaon	Paschim Kawaran	16	6	U
Dhaka	Mirpur	Harirumpur	14	5	U
Dhaka	Gulshan	Gpta	16	6	U
Cox's Bazar	Cox's Bazar	Tekpara Uttar	16	7	U
Comilla	Laksham	Peara pur	16	12	U
Chittagong	Chandgaon	Chandgaon	16	11	U
Chittagong	Double Mooring	Lalkhan Bazar	16	6	U
Chittagong	Sitakundo	Mondaritala	16	10	U
Chittagong	Kotwali	Dewan Bazar	16	9	U
Chandpur	Chandpur	Pal Bazar Stuand Rd	16	11	U
Barisal	Barisal Sadar	Paschim Kownia	15	8	U
Bagerhat	Bagerhat	Paschim Harin Khana	14	6	U
Sylhet	Golabgonj	Purba Harin Khana Katkhai	16	7	R
Sunamgonj	Chatak	Purba Pirpur	16	7	R
Sherpur	Nalitabari	Kannagar	16	7	R
Serajgonj	Ullahpara	Jagjibanpur	16	7	R
Satkhira	Shyam nagar	Kalinchi	15	7	R
Sariatpur	Bhidargonj	Bahirchar, Kadamtali	16	7	R
Rangpur	Pirganj	Lakshmi Narayanpur Durapur, Mithipur	16	8	R
Netrokona	Madan	Paroshkila, Bhabanipur, Dakshin Bajitpur	16	8	R
Nawabgonj	Gomastapur	Paltapur, Ramkandar	16	11	R
Mymensingh	Bhaluka	Uthura Jatia	16	5	R

District	Upazila/Thana	Mauza/Mahalla (PSU)	Household covered HES	CNS	Urban/ Rural
Lalmonirhat	Patgram	Rasulganj	16	5	R
Lakshmipur	Ramganj	Fathepur	16	14	R
Kishoregonj	Hossainpur	Syedpur, Gangatia, Kesena	16	7	R
Joypurhat	Panchbibi	Naogaon, Bihigaon	16	8	R
Jamalpur	Jamalpur	Purba Pardighali Holde	16	8	R
Habiganj	Banyachang	Nagura Alampur	16	8	R
Gazipur	Kaliakair	Shahebabad, Uttar, Rajbari	16	7	R
Feni	Chagalniya	Pathannagar	16	9	R
Cox's Bazar	Ramu	Umkhali	16	8	R
Comilla	Muradnagar	Trish	16	12	R
Brahmanbaria	Kasba	Durian, chalk chandrapur	16	14	R
Brahmanbaria	Nabinagar	Baldibari, Chatur Anga	14	3	R
Bhola	Daulat Khan	Barachar, Lamchipata	13	4	R
Barisal	Muladi	Decrechar	16	8	R
Barguna	Amtali	Pujakhola	15	8	R
Bagerhat	Morrelgonj	Badnibhanga	15	5	R
Total (Second quarter)			718	359	48
Urban			310	157	20
Rural			408	202	28

List of PSUs Surveyed by Quarter
Third Quarter: October 6, 1989 to October 21, 1989

District	Upazila/Thana	Mauza/Mahalla (PSU)	Household covered HES	CNS	Urban/ Rural
Chittagong	Sitakunda	Golabaria	16	8	U
Chittagong	Chandgaon	Chandgaon	16	8	U
Chittagong	Pahartali	Foezlake	16	6	U
Noakhali	Shudaram	Kazir Taluk	16	10	R
Comilla	Kotwali	Thawtala, Thoatala	16	5	U
Comilla	Laksham	Fatapur	15	9	U
Comilla	Chandina	Chandina	15	6	R
Chandpur	Matlab	Palalokdi, Sarangdi	16	11	R
Sylhet	Kotwali	Kazal Sha	13	6	U
Sylhet	Srimongol	Higli	16	10	R
Dhaka	Gulshan	Chammurkhan, Amya	16	13	U
Dhaka	Cantonment	Uttara Model town	14	1	U
Dhaka	Keranigonj	Subbadya	16	8	U
Dhaka	Sutrapur	R.MDas Road (part 1)	16	5	U
Narayangonj	Fatullah	Karimpur, Kaympur	16	7	U
Munshigonj	Munshigonj	Khalcoat matpara	15	7	U
Gazipur	Kaligonj	Deopara, Charmirpar	16	8	R
Narshingdi	Monohardi	Aka Nagar	16	6	R
Dhaka	Keranigonj	Astadona, Janjer	16	8	R
Manikgonj	Singair	Dakhin Utail, Pabanuap	16	10	R
Gopalgonj	Tungipara	Bara-Dumuria	16	8	R
Sariatpur	Goshairhat	Kechuarpur	16	13	R
Sherpur	Nakla	Bori Kandi, Adampur	16	10	R
Tangail	Kalihati	Dari Khashila	15	5	R
Mymensingh	Gaffargaon	Baraigaon	16	5	R
Mymensingh	Nandail	Aranna pasha	16	12	R

District	Upazila/Thana	Mauza/Mahalla (PSU)	Household covered HES	CNS	Urban/ Rural
Mymensingh	Phulpur	Fatepur	16	11	R
Kishoregonj	Tarail	Karati	16	5	R
Khulna	Khulna	B.K.Roy Road	16	8	U
Bagerhat	Mongla	Kumer danga	16	10	U
Khulna	Rupsha	Domra Bakchandanair	16	9	R
Jessore	Kotwali	Charamonkati	16	7	R
Jessore	Kotwali	Nilgonj, Tanki para	16	10	U
Jessore	Monirampur	Subalkhati	16	5	R
Kushtia	Bheramara	Shatbaria	14	7	U
Rajshahi	Boalia	Sri rampur	16	8	U
Naogaon	Niamatpur	Chandpukuria, Bagban	16	8	R
Naogaon	Mohadebpur	Barabakpur	14	6	R
Rajshahi	Paba	Kechautail	16	8	R
Natore	Lalpur	Chakia binodpur	16	6	R
Dinajpur	Parbotipur	Naushira, Sultanpur Nayapara, Ibrahim nagar	16	9	U
Thakurgaon	Thakurgaon	Mulankuri	16	6	R
Panchaghar	Tetulia	Moinagury	16	6	R
Rangpur	Rangpur	New Eng. para	16	4	U
Lalmonirhat	Aditmari	Dighol Bari	16	4	R
Kurigram	Ulipur	Sribalabpur, Boruatobakpur	16	9	R
Bogra	Sariakandi	Barai kandi	16	7	R
Pabna	Ishordi	Nadha Aramkhola	16	6	U
Pabna	Sujanagar	Barajor Pukuria	16	13	R

List of PSUs Surveyed by Quarter
Fourth Quarter: January 7, 1990 to January 22, 1990

District	Upazila/Thana	Mauza/Mahalla (PSU)	Household covered HES	CNS	Urban/ Rural
Chittagong	Kotwali	Patharghata	16	4	U
Chittagong	Fatikchari	Uttar paindang dalu	16	7	R
Chittagong	Bashkhali	Janngol Pairang	16	8	R
Noakhali	Sudharam	Fatehpur, Chandrapur	16	7	U
Feni	Sonagaji	Uttar Jaspur	16	11	R
Comilla	Debi deowar	Mugsar	16	9	R
Comilla	Choudah gram	Khairan Khal	16	9	R
Sylhet	Balagonj	Gayaspur, Ujalpur	16	7	R
Dhaka	Mirpur	Bhatulia	16	8	U
Dhaka	Mohammadpur	Bashila	16	7	U
Dhaka	Ramna	Shahbag	16	5	U
Dhaka	Motijheel	Rajarbag Police Line	16	6	U
Dhaka	Demra	Kayat para, Moadipur	16	6	U
Narayangonj	Bandor	Nurpadditartaria	16	9	U
Narayangonj	Ari hazar	Galo kandi	16	12	R
Dhaka	Dhamrai	Lomba dar, Chandipur	16	7	R
Faridpur	Kotwali	Purba goal chamat	16	7	U
Shariatpur	Palong	Ara gaon	16	12	U
Goalondo	Baliakandi	Harikhola, Gobindapur	16	11	R
Faridpur	Kotwali	Mallikpur	16	8	R
Gopalgonj	Kotali para	Dumuria, Saturia	15	8	R
Jamalpur	Sharisha bari	Adra	16	10	R

District	Upazila/Thana	Mauza/Mahalla (PSU)	Household covered HES	CNS	Urban/ Rural
Tangail	Kalihati	Luhuria, Shalikabari	15	8	R
Tangail	Ghatail	Parshi	16	11	R
Kishoregonj	Karimgonj	Patuair	16	9	R
Khulna	Daulatpur	Boira Jun, Khalishpur	15	5	U
Satkhira	Kaligonj	Kasiwar pur	16	4	R
Pirojpur	Pirojpur	Baro Khaliha Khali	16	3	U
Barisal	Muladi	Choto Khaliaha Khali Kayatmara	16	9	R
Narail	Narail	Bhatia borasola	16	8	U
Jhinaida	Sailkupa	Nandir Ghati	16	8	R
Magura	Mohammadpur	Khaduna, Bethalia	16	10	R
Borguna	Betagi	Talgachhia, Gariabunia	15	10	R
Chuadanga	Chuadanga	Baganpara, sardarpara	16	7	U
Kushtia	Kushtia	Gaznabipur	16	7	R
Rajshahi	Boalia	Bosepara	16	5	U
Natore	Natore	Lalbazar	16	3	U
Natore	Natore	Kholabaria	16	9	R
Panchagar	Panchagar	Kazipara, Darzipara	16	9	U
Thakurgaon	Rani sonkail	Kabsa sundarpur, Moheshpur	16	4	R
Dinajpur	Nowabganj	Chak dula Narayangpur	16	5	R
Dinajpur	Birampur	Chak Durga, Ramespur	16	12	R
Kurigram	Nageshori	Tupa mari	16	6	R
Nilphamari	Dimla	Chatunagar	16	8	R
Rangpur	Mitha pukur	Paharpur	16	6	R
Gaibandha	Gobindogonj	Taluk Sonaidanga, Baikonathpur	16	8	R
Bogra	Shibgonj	Achlai	16	7	R
Bogra	Shibgonj	Maidanhata	16	9	R
Joypurhat	Panch bibi	Arayipatabuka, Balighata	15	8	R

NCHS STANDARDS OF HEIGHT AND WEIGHT

Table D1

Reference Data for Height by Age and Weight by Age of Children 6 to 71 Months of Age.
50th percentile (Median) of height and weight

Completed age (in months)	Height (in cm)		Weight (in Kg.)		Completed age (in months)	Height (in cm)		Weight (in Kg)	
	Boys	Girls	Boys	Girls		Boys	Girls	Boys	Girls
6	67.8	65.9	7.8	7.2	39	97.0	96.0	15.2	14.6
7	69.5	67.6	8.3	7.7	40	97.7	96.6	15.3	14.8
8	71.0	69.1	8.8	8.2	41	98.4	97.3	15.5	14.9
9	72.3	70.4	9.2	8.6	42	99.1	97.9	15.7	15.1
10	73.6	71.8	9.5	8.9	43	99.7	98.6	15.8	15.2
11	74.9	73.1	9.9	9.2	44	100.4	99.2	16.0	15.4
12	76.1	74.3	10.2	9.5	45	101.0	99.8	16.2	15.5
13	77.2	75.5	10.4	9.8	46	101.7	100.4	16.4	15.7
14	78.3	76.7	10.7	10.0	47	102.3	101.0	16.5	15.8
15	79.4	77.8	10.9	10.2	48	102.9	101.6	16.7	16.0
16	80.4	78.9	11.1	10.4	49	103.6	102.2	16.9	16.1
17	81.4	79.9	11.3	10.6	50	104.2	102.8	17.0	16.2
18	82.4	80.9	11.5	10.8	51	104.8	103.4	17.2	16.4
19	83.3	81.9	11.7	11.0	52	105.4	104.0	17.4	16.5
20	84.2	82.9	11.8	11.2	53	106.0	104.5	17.5	16.7
21	85.1	83.8	12.0	11.4	54	106.6	105.1	17.7	16.8
22	86.0	84.7	12.2	11.5	55	107.1	105.6	17.9	17.0
23	86.8	85.6	12.4	11.7	56	107.7	106.2	18.0	17.1
24	85.6	84.5	12.3	11.8	57	108.3	106.7	18.2	17.2
25	86.4	85.4	12.5	12.0	58	108.8	107.3	18.3	17.4
26	87.2	86.2	12.7	12.2	59	109.4	107.8	18.5	17.5
27	88.1	87.0	12.9	12.4	60	109.9	108.4	18.7	17.7
28	88.9	87.9	13.1	12.6	61	110.5	108.9	18.8	17.8
29	89.7	88.7	13.3	12.8	62	111.0	109.5	19.0	18.0
30	90.4	89.5	13.5	13.0	63	111.5	110.0	19.2	18.1
31	91.2	90.2	13.7	13.2	64	112.1	110.5	19.3	18.3
32	92.0	91.0	13.9	13.4	65	112.6	111.0	19.5	18.4
33	92.7	91.7	14.1	13.6	66	113.1	111.6	19.7	18.6
34	93.5	92.5	14.3	13.8	67	113.6	112.1	19.8	18.7
35	94.2	93.2	14.4	13.9	68	114.1	112.6	20.0	18.9
36	94.9	93.9	14.6	14.1	69	114.6	113.1	20.2	19.0
37	95.6	94.6	14.8	14.3	70	115.1	113.6	20.3	19.2
38	96.3	95.3	15.0	14.4	71	115.6	114.1	20.5	19.4

District	Upazila/Thana	Mauza/Mahalla (PSU)	Household covered HES	CNS	Urban/ Rural
Tangail	Kalihati	Luhuria, Shalikabari	15	8	R
Tangail	Ghatail	Parshi	16	11	R
Kishoregonj	Karimgonj	Patuair	16	9	R
Khulna	Daulatpur	Boira Jun, Khalishpur	15	5	U
Satkhira	Kaligonj	Kasiwar pur	16	4	R
Pirojpur	Pirojpur	Baro Khaliha Khali	16	3	U
Barisal	Muladi	Choto Khaliaha Khali Kayatmara	16	9	R
Narail	Narail	Bhatia borasola	16	8	U
Jhinaida	Sailkupa	Nandir Ghati	16	8	R
Magura	Mohammadpur	Khaduna, Bethalia	16	10	R
Borguna	Betagi	Talgachhia, Gariabunia	15	10	R
Chuadanga	Chuadanga	Baganpara, sardarpara	16	7	U
Kushtia	Kushtia	Gaznabipur	16	7	R
Rajshahi	Boalia	Bosepara	16	5	U
Natore	Natore	Lalbazar	16	3	U
Natore	Natore	Kholabaria	16	9	R
Panchagar	Panchagar	Kazipara, Darzipara	16	9	U
Thakurgaon	Rani sonkail	Kabsa sundarpur, Moheshpur	16	4	R
Dinajpur	Nowabganj	Chak dula Narayangpur	16	5	R
Dinajpur	Birampur	Chak Durga, Ramespur	16	12	R
Kurigram	Nageshori	Tupa mari	16	6	R
Nilphamari	Dimla	Chatunagar	16	8	R
Rangpur	Mitha pukur	Paharpur	16	6	R
Gaibandha	Gobindogonj	Taluk Sonaidanga, Baikonathpur	16	8	R
Bogra	Shibgonj	Achlai	16	7	R
Bogra	Shibgonj	Maidanhata	16	9	R
Joypurhat	Panch bibi	Arayipatabuka, Balighata	15	8	R

NCHS STANDARDS OF HEIGHT AND WEIGHT

Table D1

Reference Data for Height by Age and Weight by Age of Children 6 to 71 Months of Age.
50th percentile (Median) of height and weight

Completed age (in months)	Height (in cm)		Weight (in Kg.)		Completed age (in months)	Height (in cm)		Weight (in Kg)	
	Boys	Girls	Boys	Girls		Boys	Girls	Boys	Girls
6	67.8	65.9	7.8	7.2	39	97.0	96.0	15.2	14.6
7	69.5	67.6	8.3	7.7	40	97.7	96.6	15.3	14.8
8	71.0	69.1	8.8	8.2	41	98.4	97.3	15.5	14.9
9	72.3	70.4	9.2	8.6	42	99.1	97.9	15.7	15.1
10	73.6	71.8	9.5	8.9	43	99.7	98.6	15.8	15.2
11	74.9	73.1	9.9	9.2	44	100.4	99.2	16.0	15.4
12	76.1	74.3	10.2	9.5	45	101.0	99.8	16.2	15.5
13	77.2	75.5	10.4	9.8	46	101.7	100.4	16.4	15.7
14	78.3	76.7	10.7	10.0	47	102.3	101.0	16.5	15.8
15	79.4	77.8	10.9	10.2	48	102.9	101.6	16.7	16.0
16	80.4	78.9	11.1	10.4	49	103.6	102.2	16.9	16.1
17	81.4	79.9	11.3	10.6	50	104.2	102.8	17.0	16.2
18	82.4	80.9	11.5	10.8	51	104.8	103.4	17.2	16.4
19	83.3	81.9	11.7	11.0	52	105.4	104.0	17.4	16.5
20	84.2	82.9	11.8	11.2	53	106.0	104.5	17.5	16.7
21	85.1	83.8	12.0	11.4	54	106.6	105.1	17.7	16.8
22	86.0	84.7	12.2	11.5	55	107.1	105.6	17.9	17.0
23	86.8	85.6	12.4	11.7	56	107.7	106.2	18.0	17.1
24	85.6	84.5	12.3	11.8	57	108.3	106.7	18.2	17.2
25	86.4	85.4	12.5	12.0	58	108.8	107.3	18.3	17.4
26	87.2	86.2	12.7	12.2	59	109.4	107.8	18.5	17.5
27	88.1	87.0	12.9	12.4	60	109.9	108.4	18.7	17.7
28	88.9	87.9	13.1	12.6	61	110.5	108.9	18.8	17.8
29	89.7	88.7	13.3	12.8	62	111.0	109.5	19.0	18.0
30	90.4	89.5	13.5	13.0	63	111.5	110.0	19.2	18.1
31	91.2	90.2	13.7	13.2	64	112.1	110.5	19.3	18.3
32	92.0	91.0	13.9	13.4	65	112.6	111.0	19.5	18.4
33	92.7	91.7	14.1	13.6	66	113.1	111.6	19.7	18.6
34	93.5	92.5	14.3	13.8	67	113.6	112.1	19.8	18.7
35	94.2	93.2	14.4	13.9	68	114.1	112.6	20.0	18.9
36	94.9	93.9	14.6	14.1	69	114.6	113.1	20.2	19.0
37	95.6	94.6	14.8	14.3	70	115.1	113.6	20.3	19.2
38	96.3	95.3	15.0	14.4	71	115.6	114.1	20.5	19.4

Table D2

Reference Data for Weight by Height of Children 6 to 71 Months
50th Percentile (median) of weight in Kg.

Height (in Cm)	Boys	Girls	Height (in Cm)	Boys	Girls
50.0	3.3	3.4	86.0	12.1	12.0
51.0	3.5	3.5	87.0	12.3	12.3
52.0	3.7	3.7	88.0	12.5	12.5
53.0	3.9	3.9	89.0	12.8	12.7
54.0	4.1	4.1	90.0	13.0	12.9
55.0	4.3	4.3	91.0	13.5	13.2
56.0	4.6	4.5	92.0	13.7	13.4
57.0	4.8	4.8	93.0	14.0	13.6
58.0	5.1	5.0	94.0	14.2	13.9
59.0	5.4	5.3	95.0	14.5	14.1
60.0	5.7	5.5	96.0	14.7	14.3
61.0	5.9	5.8	97.0	15.0	14.6
62.0	6.2	6.1	98.0	15.2	14.9
63.0	6.5	6.4	99.0	15.5	15.1
64.0	6.8	6.7	100.0	15.7	15.4
65.0	7.1	7.0	101.0	16.0	15.6
66.0	7.4	7.3	102.0	16.3	15.9
67.0	7.7	7.5	103.0	16.6	16.2
68.0	8.0	7.8	104.0	16.9	16.5
69.0	8.3	8.1	105.0	17.1	16.7
70.0	8.5	8.4	106.0	17.4	17.0
71.0	8.8	8.6	107.0	17.7	17.3
72.0	9.1	8.9	108.0	18.0	17.6
73.0	9.3	9.1	109.0	18.3	17.9
74.0	9.6	9.4	110.0	18.7	18.2
75.0	9.8	9.6	111.0	19.0	18.6
76.0	10.0	9.8	112.0	19.3	18.9
77.0	10.3	10.0	113.0	19.6	19.2
78.0	10.5	10.2	114.0	20.0	19.5
79.0	10.7	10.4	115.0	20.3	19.9
80.0	10.9	10.6	116.0	20.7	20.3
81.0	11.1	10.8	117.0	21.1	20.6
82.0	11.3	11.0	118.0	21.4	21.0
83.0	11.5	11.2	119.0	21.8	21.4
84.0	11.7	11.4	120.0	22.2	21.8
85.0	11.9	11.6			

Source : *NCHS growth charts, extracted from 'Measuring Change in Nutritional Status' by World Health Organization, Geneva, 1983.*

STANDARD ERROR OF SOME SELECTED INDICATORS

The report estimates the malnutrition prevalence rates for different anthropometric measures. If Z-scores are used, the prevalence rates are defined by percent of children below -2SD of reference median. A child can be either malnourished or not malnourished. If the Z-score of a child is below -2SD, the child is considered malnourished. This "dichotomous" outcome implies that we are dealing with a binomial distribution and the standard error of outcome variables should be estimated assuming a binomial distribution.

If P_j= probability that a child in category j is malnourished

$Q_j = (1-P_j)$

The variance for the distribution of proportion malnourished in a sample of n_j children in the category will be

$$V_j = (P_j Q_j)/n_j$$

The Standard Error (SE) will be $SE_j = \{ (P_j Q_j)/n_j \}^{0.5}$

If a single category consists of m different strata with weights Wj, the standard error for the category should be,

$$SE_k = \{ \Sigma_j (W_j^2 P_j Q_j/n_j) \}^{0.5} \text{ where Sum } (W_j) = 1$$

Tables D1, D2 and D3 report the SE of the prevalence of malnutrition using three Z-score based indicators by different age groups and area of residence.

Table E1

Prevalence of Stunting among Children (both sexes)
by Age and Area with Standard Error

	Rural Area			Urban Area			National		
Age groups (in months)	Percent LT-2SD	Sample (number)	SE (percent)	Percent LT-2SD	Sample (number)	SE (percent)	Percent LT-2SD	Sample (Number)	SE (percent)
TOTAL	66.7	1513	1.21	58.4	843	1.70	65.5	2356	1.05
6-11	48.6	146	4.14	34.8	73	5.58	46.5	219	1.11
12-23	70.7	267	2.79	67.1	140	3.97	70.5	407	1.01
24-35	65.6	300	2.74	59.5	153	3.97	64.9	453	1.06
36-47	68.5	267	2.84	57.6	151	4.02	67.3	418	1.04
48-59	67.2	263	2.89	58.0	154	3.98	66.6	417	1.05
60-72	71.1	270	2.76	61.1	172	3.72	69.9	442	1.01

Table E2

Prevalence of Underweight among Children (both sexes)
by Age and Area with Standard Error

Age groups (in months)	Rural Area Percent LT-2SD	Rural Area Sample (number)	Rural Area SE (percent)	Urban Area Percent LT-2SD	Urban Area Sample (number)	Urban Area SE (percent)	National Percent LT-2SD	National Sample (Number)	National SE (percent)
TOTAL	66.6	1513	1.21	62.7	843	1.67	66.5	2356	1.05
6-11	57.6	146	4.09	44.5	73	5.82	56.9	219	1.10
12-23	79.4	267	2.48	71.4	140	3.82	78.6	407	0.91
24-35	66.0	300	2.73	67.3	153	3.79	66.2	453	1.05
36-47	61.1	267	2.98	62.9	151	3.93	61.2	418	1.08
48-59	61.9	263	2.99	59.3	154	3.96	61.5	417	1.08
60-72	69.6	270	2.80	62.2	172	3.70	68.8	442	1.03

Table E3

Prevalence of Wasting among Children (both sexes)
by Age and Area with Standard Error

Age groups (in months)	Rural Area Percent LT-2SD	Rural Area Sample (number)	Rural Area SE (percent)	Urban Area Percent LT-2SD	Urban Area Sample (number)	Urban Area SE (percent)	National Percent LT-2SD	National Sample (Number)	National SE (percent)
TOTAL	14.7	1513	0.91	14.1	843	1.20	14.7	2356	0.79
6-11	14.6	146	2.92	12.5	73	3.87	14.4	219	0.78
12-23	28.0	267	2.75	26.5	140	3.73	27.7	407	1.00
24-35	15.0	300	2.06	14.4	153	2.84	15.0	453	0.79
36-47	10.9	267	1.91	6.7	151	2.03	10.4	418	0.69
48-59	8.3	263	1.70	12.2	154	2.64	8.9	417	0.62
60-72	10.7	270	1.88	12.8	172	2.55	11.0	442	0.69

TABLES

Table F1

Mean Weight of Bangladesh Children by age and sex in comparison with reference standard, 1989-90.

Age (in month)	Boy's (weight in Kg.)			Girls (weight in Kg.)		
	Bangladesh mean 1989-90	NCHS 3rd percentile	NCHS median (50th percentile)	Bangladesh mean 1989-90	NCHS 3rd percentile	NCHS median (50th percentile)
6	6.2	6.0	7.8	5.3	5.6	7.2
7	6.5	6.5	8.3	6.0	6.0	7.7
8	6.5	7.0	8.8	6.2	6.4	8.2
9	7.1	7.4	9.2	6.2	6.7	8.6
10	6.9	7.7	9.5	6.6	7.0	8.9
11	8.1	8.0	9.9	7.0	7.3	9.2
12	7.2	8.2	10.2	7.2	7.6	9.5
13	7.6	8.5	10.4	6.7	7.8	9.8
14	7.7	8.7	10.7	7.3	8.0	10.0
15	8.4	8.8	10.9	7.1	8.1	10.2
16	8.2	9.0	11.1	8.9	8.3	10.4
17	8.2	9.1	11.3	7.4	8.5	10.6
18	8.3	9.3	11.5	7.1	8.6	10.8
19	8.6	9.4	11.7	7.6	8.8	11.0
20	8.1	9.5	11.8	8.6	8.9	11.2
21	8.7	9.7	12.0	7.9	9.1	11.4
22	8.4	9.8	12.2	8.0	9.3	11.5
23	9.2	9.9	12.4	8.3	9.4	11.7
24	9.4	10.2	12.3	9.2	9.6	11.8
25	9.0	10.3	12.5	9.0	9.7	12.0
26	9.4	10.4	12.7	9.5	9.9	12.2
27	10.2	10.6	12.9	8.9	10.1	12.4
28	9.7	10.7	13.1	9.1	10.2	12.6
29	9.8	10.8	13.3	9.5	10.4	12.8
30	9.6	10.9	13.5	9.2	10.5	13.0
31	10.3	11.0	13.7	10.1	10.6	13.2
32	11.3	11.1	13.9	9.6	10.8	13.4
33	10.3	11.3	14.1	10.2	10.9	13.6
34	10.3	11.4	14.3	10.7	11.1	13.8
35	11.4	11.5	14.4	10.3	11.2	13.9
36	11.7	11.6	14.6	10.8	11.3	14.1
37	10.5	11.7	14.8	10.6	11.5	14.3
38	10.6	11.9	15.0	10.8	11.6	14.4
39	11.1	12.0	15.2	11.6	11.7	14.6
40.	11.4	12.1	15.3	10.8	11.8	14.8
41	11.5	12.2	15.5	10.8	12.0	14.9
42	11.5	12.4	15.7	11.7	12.1	15.1
43	10.9	12.5	15.8	10.9	12.2	15.2
44	12.5	12.6	16.0	11.2	12.3	15.4
45	12.8	12.7	16.2	11.4	12.4	15.5
46	13.3	12.9	16.4	11.5	12.5	15.7
47	12.9	13.0	16.5	11.9	12.6	15.8

Table F1 (Continued)

Mean Weight of Bangladesh Children by age and sex in comparison with reference standard, 1989-90.

Age (in month)	Boy's (weight in Kg.)			Girls (weight in Kg.)		
	Bangladesh mean 1989-90	NCHS 3rd percentile	NCHS median (50th percentile)	Bangladesh mean 1989-90	NCHS 3rd percentile	NCHS median (50th percentile)
48	12.0	13.1	16.7	12.5	12.8	16.0
49	12.5	13.2	16.9	12.2	12.9	16.1
50	12.6	13.4	17.0	12.9	13.0	16.2
51	13.0	13.5	17.2	12.4	13.1	16.4
52	12.8	13.6	17.4	11.9	13.2	16.5
53	13.1	13.8	17.5	12.4	13.3	16.7
54	14.3	13.9	17.7	12.1	13.4	16.8
55	13.2	14.0	17.9	12.3	13.5	17.0
56	13.5	14.2	18.0	11.9	13.6	17.1
57	13.8	14.3	18.2	11.6	13.7	17.2
58	13.1	14.4	18.3	12.6	13.8	17.4
59	14.2	14.6	18.5	12.5	13.9	17.5
60	14.0	14.7	18.7	13.8	14.0	17.7
61	13.5	14.8	18.8	12.7	14.1	17.8
62	13.3	15.0	19.0	14.0	14.2	18.0
63	14.0	15.1	19.2	12.3	14.3	18.1
64	13.9	15.2	19.3	13.2	14.4	18.3
65	14.0	15.4	19.5	12.8	14.5	18.4
66	14.0	15.5	19.7	14.1	14.6	18.6
67	14.3	15.6	19.8	13.6	14.7	18.7
68	14.2	15.8	20.0	13.5	14.9	18.9
69	15.4	15.9	20.2	13.2	15.0	19.0
70	14.7	16.0	20.3	14.2	15.1	19.2
71	15.5	16.2	20.5	14.7	15.2	19.4

Table F2

Distribution of Weight by height of male/female children in comparison with reference standard, 1989-90.

Height (cm)	Boy's (weight in kg.)			Girls (weight in kg.)		
	Bangladesh mean 1989-90	NCHS 3rd percentile	NCHS median (50th percentile)	Bangladesh mean 1989-90	NCHS 3rd percentile	NCHS median (50th percentile)
58	4.1	4.0	5.1	5.5	3.9	5.0
59	6.0	4.2	5.4	5.3	4.2	5.3
60	5.3	4.4	5.7	5.5	4.4	5.5
61	6.0	4.7	5.9	5.6	4.6	5.8
62	5.6	5.0	6.2	5.9	4.9	6.1
63	6.5	5.2	6.5	6.1	5.1	6.4
64	6.3	5.5	6.8	6.2	5.4	6.7
65	6.5	5.8	7.1	6.2	5.6	7.0
66	6.5	6.1	7.4	6.6	5.9	7.3
67	7.2	6.3	7.7	7.0	6.1	7.5
68	7.1	6.6	8.0	6.8	6.4	7.8
69	7.3	6.9	8.3	7.2	6.6	8.1
70	7.7	7.1	8.5	7.2	6.9	8.4
71	7.7	7.4	8.8	7.7	7.1	8.6
72	8.0	7.6	9.1	8.0	7.3	8.9
73	8.2	7.9	9.3	7.8	7.6	9.1
74	8.4	8.1	9.6	8.3	7.8	9.4
75	8.5	8.3	9.8	8.9	8.0	9.6
76	8.9	8.5	10.0	8.6	8.2	9.8
77	9.2	8.7	10.3	9.0	8.4	10.0
78	9.2	8.9	10.5	8.9	8.6	10.2
79	9.4	9.1	10.7	9.2	8.8	10.4
80	9.9	9.3	10.9	9.8	8.9	10.6
81	10.0	9.5	11.1	9.9	9.1	10.8
82	10.3	9.7	11.3	9.9	9.3	11.0
83	10.7	9.8	11.5	10.5	9.5	11.2
84	10.7	10.0	11.7	10.6	9.7	11.4
85	10.8	10.2	11.9	10.7	9.8	11.6
86	11.3	10.3	12.1	11.0	10.0	12.0
87	11.7	10.5	12.3	11.5	10.2	12.3
88	11.9	10.7	12.5	11.2	10.4	12.5
89	12.1	10.9	13.8	11.8	10.6	12.7
90	12.1	11.1	13.0	11.8	10.8	12.9
91	12.4	11.3	13.5	11.9	11.0	13.2
92	12.2	11.5	13.7	11.9	11.2	13.4
93	12.7	11.7	14.0	12.0	11.4	13.6
94	12.8	11.9	14.2	12.6	11.6	13.9
95	13.2	12.1	14.5	13.2	11.8	14.1
96	13.6	12.3	14.7	13.4	12.0	14.3
97	13.5	12.5	15.0	13.1	12.2	14.6
98	13.6	12.7	15.2	13.3	12.4	14.9
99	13.8	12.9	15.5	14.2	12.6	15.1
100	14.3	13.2	15.7	13.3	12.8	15.4
101	14.8	13.4	16.0	14.2	13.0	15.6
102	15.2	13.6	16.3	14.2	13.3	15.9
103	14.7	13.9	16.6	14.4	13.5	16.2
104	15.7	14.1	16.9	14.5	13.7	16.5

Table F2 (Continued)

Distribution of Weight by height of male/female children in comparison with reference standard, 1989-90.

Height (cm)	Boy's (weight in kg.)			Girls (weight in kg.)		
	Bangladesh mean 1989-90	NCHS 3rd percentile	NCHS median (50th percentile)	Bangladesh mean 1989-90	NCHS 3rd percentile	NCHS median (50th percentile)
105	15.9	14.3	17.1	15.5	14.0	16.7
106	16.0	14.6	17.4	16.0	14.2	17.0
107	15.9	14.8	17.7	15.3	14.4	17.3
108	16.0	15.1	18.0	16.5	14.7	17.6
109	17.3	15.4	18.3	16.0	15.0	17.9
110	16.0	15.6	18.7	16.6	15.2	18.2
111	16.0	15.9	19.0	16.7	15.5	18.6
112	17.6	16.2	19.3	18.8	15.8	18.9

Table F3

Mean Height of Bangladesh Children by age and sex in comparison with reference standard, 1989-90.

Age (in month)	Boy's (Height in c.m.)			Girls (Height in c.m.)		
	Bangladesh mean 1989-90	NCHS 3rd percentile	NCHS median (50th percentile)	Bangladesh mean 1989-90	NCHS 3rd percentile	NCHS median (50th percentile)
6	63.1	62.8	67.8	61.5	61.0	65.9
7	65.1	64.5	69.5	62.3	62.5	67.6
8	67.1	66.0	71.0	63.7	64.0	69.1
9	68.3	67.4	72.3	65.6	65.3	70.4
10	67.9	68.7	73.6	66.1	66.6	71.8
11	71.9	69.9	74.9	67.3	67.8	73.1
12	68.5	71.0	76.1	72.7	69.0	74.3
13	71.2	72.1	77.2	67.6	70.1	75.5
14	71.3	73.1	78.3	69.8	71.2	76.7
15	73.6	74.1	79.4	71.1	72.2	77.8
16	73.0	75.0	80.4	73.3	73.2	78.9
17	73.9	75.9	81.4	70.7	74.2	79.9
18	75.6	76.7	82.4	69.4	75.1	80.9
19	75.2	77.5	83.3	72.8	76.1	81.9
20	73.7	78.3	84.2	74.6	77.0	82.9
21	75.1	79.1	85.1	74.1	77.8	83.8
22	75.6	79.8	86.0	73.7	78.7	84.7
23	78.3	80.6	86.8	75.5	79.5	85.6
24	79.2	79.6	85.6	78.1	78.5	84.5
25	77.1	80.3	86.4	78.1	79.2	85.4
26	77.7	81.0	87.2	78.4	80.0	86.2
27	81.2	81.7	88.1	77.3	80.7	87.0
28	79.3	82.4	88.9	79.0	81.4	87.9
29	79.9	83.1	89.7	80.8	82.2	88.7

Table F3 (Continued)

Mean Height of Bangladesh Children by age and sex in comparison with reference standard, 1989-90.

Age (in month)	Boy's (Height in c.m.)			Girls (Height in c.m.)		
	Bangladesh mean 1989-90	NCHS 3rd percentile	NCHS median (50th percentile)	Bangladesh mean 1989-90	NCHS 3rd percentile	NCHS median (50th percentile)
30	80.6	83.8	90.4	79.3	82.9	89.5
31	81.4	84.5	91.2	82.8	83.6	90.2
32	85.0	85.2	92.0	81.6	84.3	91.0
33	82.9	85.8	92.7	82.3	84.9	91.7
34	83.4	86.5	93.5	83.4	85.6	92.5
35	86.8	87.1	94.2	84.5	86.3	93.2
36	87.2	87.8	94.9	84.9	86.9	93.9
37	84.0	88.4	95.6	83.9	87.6	94.6
38	82.0	89.0	96.3	86.6	88.2	95.3
39	85.9	89.6	97.0	86.8	88.8	96.0
40	88.2	90.2	97.7	85.8	89.4	96.6
41	87.5	90.9	98.4	86.6	90.0	97.3
42	87.8	91.5	99.1	88.7	90.6	97.9
43	84.0	92.0	99.7	85.1	91.2	98.6
44	92.6	92.6	100.4	87.6	91.8	99.2
45	92.1	93.2	101.0	88.5	92.3	99.8
46	94.5	93.8	101.7	89.5	92.9	100.4
47	91.7	94.4	102.3	90.0	93.5	101.0
48	91.2	94.9	102.9	93.3	94.0	101.6
49	92.5	95.5	103.6	90.2	94.6	102.2
50	91.9	96.0	104.2	93.8	95.1	102.8
51	94.2	96.6	104.8	92.9	95.6	103.4
52	93.6	97.1	105.4	91.3	96.1	104.0
53	95.2	97.7	106.0	92.6	96.6	104.5
54	97.5	98.2	106.6	93.6	97.2	105.1
55	95.0	98.7	107.1	94.9	97.7	105.6
56	95.9	99.2	107.7	92.1	98.1	106.2
57	97.9	99.8	108.3	91.9	98.6	106.7
58	95.5	100.3	108.8	95.2	99.1	107.3
59	97.5	100.8	109.4	94.5	99.6	107.8
60	98.4	101.3	109.9	95.8	100.1	108.4
61	99.3	101.8	110.5	96.2	100.5	108.9
62	97.8	102.3	111.0	99.1	101.0	109.5
63	98.3	102.8	111.5	95.9	101.5	110.0
64	99.2	103.2	112.1	96.9	101.9	110.5
65	100.3	103.7	112.6	95.6	102.4	111.0
66	97.6	104.2	113.1	99.0	102.8	111.6
67	100.9	104.7	113.6	99.1	103.2	112.1
68	99.8	105.1	114.1	98.8	103.7	112.6
69	103.9	105.6	114.6	97.6	104.1	113.1
70	102.5	106.0	115.1	101.3	104.5	113.6
71	104.5	106.5	115.6	101.5	105.0	114.1

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Table F4

Distribution of Actual Sample Children by Age, Sex and Area (Unweighted) 1989-90

Age (in months)	National						Urban						Rural					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Row %	100.0	-	52.4	-	47.6	-	100.0	-	53.7	-	46.3	-	100.0	-	51.6	-	48.4	-
Total	100.0	2356*	100.0	1234	100.0	1122	100.0	84.3	100.0	453	100.0	390	100.0	1513	100.0	781	100.0	732
6-11	8.0	188	7.5	93	8.5	95	6.9	59	6.4	29	7.7	30	8.5	129	8.2	64	8.9	65
12-23	17.2	405	18.1	223	16.2	182	16.4	138	20.0	91	12.1	47	17.7	267	16.9	132	18.5	135
24-35	19.0	447	17.9	221	20.1	226	18.3	154	15.7	71	21.3	83	19.4	293	19.2	150	19.5	143
36-47	18.5	437	16.9	209	20.3	228	18.4	155	15.9	72	21.3	83	18.6	282	17.6	137	19.8	145
48-59	16.9	399	18.1	223	15.7	176	17.7	149	17.7	80	17.6	69	16.5	250	18.3	143	14.6	107
60-71	20.4	480	21.5	265	19.2	215	22.3	188	24.3	110	20.0	78	19.3	292	19.8	155	18.7	137

** Grand total in 1555 households.*

Table F5

Distribution of Actual Sample Children by Age, Sex and Area (Weighted) 1989-90
(Number in thousands)

Age (in months)	National						Urban						Rural					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Total	100.0	17251	100.0	8945	100.0	8306	100.0	2005	100.0	1077	100.0	928	100.0	15246	100.0	7867	100.0	7379
6-11	8.4	1451	8.1	727	8.7	724	7.1	142	6.5	70	7.7	72	8.6	1309	8.4	657	8.8	652
12-23	17.6	3042	17.4	1558	17.9	1484	16.4	328	19.9	215	12.2	113	17.8	2714	17.1	1343	18.6	1371
24-35	19.1	3294	18.6	1662	19.6	1632	18.2	366	15.7	169	21.2	197	19.2	2928	18.9	1492	19.5	1436
36-47	18.8	3234	17.5	1566	20.1	1668	18.6	373	16.2	174	21.5	199	18.8	2861	17.7	1392	19.9	1469
48-59	16.5	2853	18.1	1615	14.9	1238	17.5	350	17.4	187	17.5	163	16.4	2503	18.1	1427	14.6	1076
60-71	19.6	3377	20.3	1817	18.8	1560	22.2	446	24.3	262	19.9	184	19.2	2931	19.8	1556	18.6	1375

Table F6

Frequency distribution of sample children by Annual percapita Expenditure by area, 1989-90

Annual per capita Expenditure (Taka)	National		Urban		Rural	
	Percent	Actual No.	Percent	Actual No.	Percent	Actual No.
Total	100.0	2356	100.0	843	100.0	1513
< 2000	4.2	98	1.4	12	5.7	86
2000 - 2499	14.9	351	6.8	57	19.4	294
2500 - 29992	1.9	517	17.1	144	24.7	373
3000 - 3999	19.7	464	18.1	153	20.6	311
4000 - 4999	11.5	271	13.4	113	10.4	158
5000 - 5999	7.8	183	11.6	98	5.6	85
6000 - 7999	5.8	136	7.7	65	4.7	71
8000 - 9999	5.6	133	10.0	84	3.2	49
> = 10000	8.6	203	13.9	117	5.7	86

Table F7

Prevalence of stunting by Annual percapita Expenditure by area, 1989-90

Annual per capita Expenditure (Taka)	National		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	51.1	1145	42.3	356	52.2	789
< 2000	67.4	66	66.9*	8	67.4	58
2000 - 2499	55.2	193	54.8	31	55.3	162
2500 - 2999	52.8	276	56.6	81	52.4	195
3000 - 3999	51.7	232	45.6	69	52.5	163
4000 - 4999	50.9	129	39.3	45	52.9	84
5000 - 5999	46.7	85	47.0	46	46.6	39
6000 - 7999	41.5	52	32.3	21	43.5	31
8000 - 9999	36.7	44	30.0	25	39.3	19
> = 10000	39.6	68	25.3	30	44.2	38

** Cell size of unweighted frequency is less than 30.*

Table F8

Prevalence of stunting by Annual percapita Expenditure broad group by area, 1989-90

Annual per capita expenditure (Taka)	National		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	51.1	1145	42.3	356	52.2	789
< 6000	53.3	981	48.7	280	53.7	701
> = 6000	39.4	164	28.5	76	42.8	88

Table F9

Prevalence of wasting of children by Total Annual Expenditure as percentage of Total Household Income, 1989-90

H.H. total annual expenditure as % of total H.H. income (%)	National		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	8.6	194	7.3	62	8.8	132
<80	7.1	21	4.3	5	7.4	16
80-89.9	7.9	22	5.0	7	8.4	15
90-99.9	9.0	88	9.2	32	8.9	56
>= 100.0	9.2	63	7.3	18	9.5	45

Table F10

Frequency distribution of children by total reported Annual per capita Expenditure on Medical care by Area, 1989-90

Annual per capita medical expenditure (Taka)	National		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	100.0	2356	100.0	843	100.0	1513
<50.0	50.5	1190	42.3	357	55.1	833
50-99.9	23.6	555	24.0	202	23.3	353
>= 100.0	25.9	611	33.7	284	21.6	327

Table F11

Prevalence of stunting by per capita reported Annual Expenditure on Medical care by Area, 1989-90

Annual per capita medical expenditure (Taka)	National		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	51.1	1145	42.3	356	52.2	789
<50.0	52.2	606	46.7	166	52.8	440
50-99.9	51.9	274	43.1	87	53.1	187
>= 100.0	47.5	265	36.0	103	49.9	162

Table F12

Prevalence of wasting by per capita reported Annual Expenditure on Medical care by Area, 1989-90

Annual per capita medical expenditure (Taka)	National		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	8.6	194	7.3	62	8.8	132
<50.0	9.6	107	7.3	26	9.8	81
50-99.9	8.7	50	9.8	20	8.6	30
>= 100.0	6.4	37	5.5	16	6.6	21

Table F13

Prevalence of wasting of children by Annual Household Expenditure on Food as percentage of Total Household Income, 1989-90

Annual H.H. expenditure on food as % of total H.H. income (%)	National		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	8.6	194	7.3	62	8.8	132
<50.0	7.0	30	7.0	13	7.0	17
>= 50.0	9.0	164	7.4	49	9.2	115

Table F14

Prevalence of Stunting by Maternal Education

Maternal Education	National				Urban				Rural			
	1985-86		1989-90		1985-86		1989-90		1985-86		1989-90	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	56.1	1702	51.1	1145	44.2	624	42.3	356	57.6	1078	52.2	789
No Education	59.8	1437	53.0	962	54.0	482	48.3	261	60.2	955	53.5	701
Passed I-V	45.1	159	45.1	114	34.1	71	38.4	54	47.1	88	46.8	60
Passed VI-IX	35.7	78	41.9	57	27.3	45	32.5	33	38.4	33	46.1	24
Passed SSC/HSC	14.8	26	19.9	12	19.0	24	15.4	8	13.3*	2	22.9*	4
Graduate and post graduate	(10.5)*	2	(o)*		(10.5)*	2	(0)*		(0)**		(0)*	

* *Cell size of unweighted frequency distribution is less than 30.*
** *Cell size of unweighted frequency distribution is equals zero.*

Table F15

Prevalence of Wasting by Maternal Education

Maternal Education	National				Urban				Rural			
	1985-86		1989-90		1985-86		1989-90		1985-86		1989-90	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	8.1	251	8.6	194	6.9	97	7.3	62	8.2	154	8.8	132
No Education	8.4	211	8.7	158	8.7	78	8.3	45	8.4	133	8.7	113
Passed I-V	7.1	25	8.3	21	5.3	11	7.0	10	7.5	14	8.6	11
Passed VI-IX	6.3	13	9.3	10	4.2	7	3.6	4	7.0	6	11.9	6
Passed SSC/HSC	3.2	2	8.4	4	2.5	1	3.9	2	6.7*	1	11.5*	2
Graduate and post graduate	(0)*	-	(7.8)*	1	(0)*	-	(11.2)*	1	-	(0)**	-	-	(0)*

* *Cell size of unweighted frequency distribution is less than 30.*
** *Cell size of unweighted frequency distribution is equals zero.*

Table F16

Prevalence of stunting by Household Toilet Facility and Area 1989-90.

Household Toilet Facility	National		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	51.1	1145	42.3	356	52.2	789
Flush	14.4	4	14.4*	4	0**	0
Sanitary/Pit	34.2	116	31.8	88	36.2	28
Municipal toilet	34.4	18	27.2	16	66.7*	2
Pond/River/Canal	43.7	71	51.9	41	41.5	30
Fixed open space	51.8	560	52.3	178	51.7	382
Open space and other	55.9	376	44.9	29	56.2	347

** Cell size in unweighted Frequency is less than 30.*
*** Cell size in unweighted Frequency is equals zero.*

Table F17

Prevalence of stunting of children by childs (under 5 years) toilet facility by area, 1989-90

Child's toilet facility	Total		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	51.1	1145	42.3	356	52.2	789
Left where the child defaecated	53.4	440	53.5	96	53.4	344
Removed out side of house by H.H. members	51.1	615	44.4	204	51.8	411
Same arrangement with others H.H. members	38.6	90	27.1	56	45.7	34

Table F18

Prevalence of wasting of children by childs (under 5 years) toilet facility by area, 1989-90

Child's toilet facility	Total		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	8.6	194	7.3	62	8.8	132
Left where the child defaecated	9.0	74	8.2	15	9.0	59
Removed out side of house by H.H. members	8.7	104	7.8	36	9.1	68
Same arrangement with others H.H. members	6.2	16	5.3	11	6.8	5

Table F19

Prevalence of wasting by period of Breast Feeding

Months Breastfeed	National	Urban	Rural	National	Urban	Rural
	1985-86			1989-90		
	Weighted percent	Weighted percent	Weighted percent	Weighted percent	Weighted percent	Weighted percent
Less than 12	7.0	5.8	7.7	8.6	3.9	10.2
12 - 24	6.4	4.2	6.7	6.4	5.9	6.5
Over 24	5.1	3.8	5.2	3.8	5.1	3.6

Table F20

Prevalence of Stunting by the occupation of the Head of the Household by Region and sex, 1989-90

Occupation of Head of Household	National		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	51.1	1145	42.3	356	52.2	789
1. Agri. Labour	55.8	213	65.0	35	55.4	178
2. Non-Agr. Labour	53.5	173	51.7	108	54.3	65
3. Farmer	51.8	345	45.4	30	52.0	315
4. Fisherman	51.3	54	57.1*	11	51.0	43
5. Businessman	43.5	164	38.3	77	44.7	87
6. Service/Staff	41.0	71	26.9	45	51.6	26
7. Service/Officer	44.2	20	21.9*	5	47.8	15
8. Others	55.7	105	42.2	45	58.9	60

** Cell size of unweighted frequency is less than 30.*

Table F21

Prevalence of Stunting of children by Household's total land by area,1989-90

H.H. Total land (in acre)	National		Urban		Rural	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Total	51.1	1145	42.3	356	52.2	789
0.00 - 0.04	58.2	366	47.7	180	61.3	186
0.05 - 0.99	51.0	460	39.4	119	52.3	341
1.00 - 2.49	47.0	169	39.8	44	47.7	125
2.50 - 7.49	47.2	125	27.1	11	48.0	114
7.50 +	39.8	25	[16.5]*	2	41.0	23

** Cell size of unweighted frequency distribution is less than 30.*

Table F22

Nutritional status by waterlow classification by time period, 1989-90.

Time periods	Total		Normal		Stunting only		Wasting only		Both stunting and wasting	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
All Time Period	100.0	2356	52.3	1293	40.8	911	3.5	79	3.4	73
1. June, 1989	100.0	690	56.9	406	32.9	220	5.7	37	4.5	27
2. August, 1989	100.0	548	51.0	287	42.7	227	3.1	18	3.2	16
3. October, 1989	100.0	577	54.2	326	39.5	217	3.5	17	2.8	17
4. January, 1990	100.0	541	46.1	274	50.2	247	1.0	7	2.7	13

Table F23

Nutritional status by Gomez classification by time period, 1989-90.

Time periods	Total		Normal		Mild		Moderate		Severe	
	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
All Time Period	100.0	2356	6.1	157	39.4	962	47.2	1073	7.3	164
1. June, 1989	100.0	690	4.6	34	39.4	276	47.4	326	8.6	54
2. August, 1989	100.0	548	6.9	40	35.3	199	52.4	280	5.4	29
3. October, 1989	100.0	577	7.4	45	38.4	236	46.9	251	7.3	45
4. January, 1990	100.0	541	6.1	38	43.9	251	42.6	216	7.4	36

GOMEZ CLASSIFICATION :

Normal : >= 90% of NCHS reference median weight for Age.

Mild (First degree Malnutrition) : 75 to 89.9% of NCHS reference median W/A.

Moderate (Second degree malnutrition) : 60 to 74.9% of NCHS reference median W/A.

Severe (Third degree malnutrition) : <60% of NCHS reference median W/A.

Table F24

Nutritional status of children by Gomez classification by Area for two years.

Area	Normal		Mild		Moderate		Severe		Sample size	
	1989-90 WT.%	1985-86 (WT.%)	1989-90 WT.%	1985-86 (WT.%)	1989-90 WT.%	1985-86 (WT.%)	1989-90 WT.%	1985-86 (WT.%)	1989-90 (No.)	1985-86 (No.)
National	6.1	5.5	39.4	34.1	47.2	51.2	7.3	9.2	2356	3283
Urban	7.9	7.6	44.3	42.2	41.6	44.2	6.2	6.0	843	1411
Rural	5.9	5.3	38.8	33.1	47.9	52.0	7.4	9.6	1513	1872

Table F25

Prevalence of Stunting by selected variables, 1989-90

Selected variables		National		Urban		Rural	
		Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Received any immunization	Yes	50.8	387	37.7	136	53.1	251
	No	51.1	752	45.8	220	51.7	532
Diarrhoea (during last 3 months)	Yes	50.9	259	44.7	66	51.5	193
	No	51.1	886	41.8	290	52.5	596
Fever/Severe Cough	Yes	52.8	304	42.7	78	53.8	226
	No	50.4	841	42.1	278	51.6	563
Measles during last 3 months	Yes	53.8	89	28.7*	13	55.8	76
	No	50.8	1056	43.0	343	51.9	713

** Cell size in the frequency distribution is < 30.*

Table F26

Prevalence of Wasting of Selected Variables, 1989-90

Selected variables		National		Urban		Rural	
		Weighted percent	Actual No.	Weighted percent	Actual No.	Weighted percent	Actual No.
Received any immunization	Yes	9.1	69	6.7	24	9.6	45
	No	8.4	124	7.8	38	8.4	86
Diarrhoea (during last 3 months)	Yes	14.3	70	11.0	16	14.5	54
	No	6.9	124	6.5	46	6.9	78
Fever/Severe Cough	Yes	12.4	71	9.0	17	12.7	54
	No	7.3	123	6.8	45	7.3	78
Measles during last 3 months	Yes	8.7	17	10.9*	5	8.6	12
	No	8.6	177	7.1	57	8.8	120

** Cell size in the frequency distribution is < 30.*

Table F27

Percent Distribution of Children age 6-59 months by HEIGHT FOR AGE Standard Deviation Category Using NCHS Reference Population (1989/90 Nutrition Module of Bangladesh)

Variable	Z-score Categories (Standard Deviations from the Median of the NCHS Reference Population)						
	-3.00 or Less	-2.99 to -2.00	-1.99 to -1.00	-0.99 to +0.99	1.00 to 1.00	+2.00 +more	Total
Age in completed months							
6-11(219)	14.4	32.3	34.4	15.3	0.5	3.1	11.5
12-23(407)	41.2	29.3	19.6	8.6	0.5	0.8	21.5
24-35(453)	33.8	31.1	17.3	15.4	1.7	0.7	23.8
36-47(418)	40.1	27.2	18.4	14.0	0.5		21.7
48-59(417)	36.3	30.0	19.5	14.2			21.4
Area of Residence							
Urban(671)	28.5	29.8	24.6	15.5	1.2	0.2	11.5
Rural(1243)	36.4	30.3	20.1	12.1	0.5	0.6	88.5
Sex							
Male(995)	34.6	31.0	20.8	12.5	0.5	0.6	52.0
Fem.(919)	36.5	29.4	20.4	12.4	0.7	0.5	48.0
Season							
April-June 1989(572)	29.0	29.2	24.0	16.0	0.6	1.2	28.2
July-Sept 1989(439)	37.3	31.3	18.5	12.1	0.5	0.3	28.2
Oct-Decm 1989(470)	32.3	29.5	22.2	14.4	0.7	1.0	25.1
Jan-March 1990(433)	42.9	29.4	16.4	10.3	0.8	0.1	18.4
All Groups	34.7	29.9	20.6	13.4	0.6	0.7	100.0
Sample	629	575	410	272	17	11	1914

Note: All percentages are calculated by weighting urban and rural observations by the multipliers derived in Appendix B.
Sample size in parentheses.

Percent Distribution of Children age 6-59 months by WEIGHT FOR HEIGHT Standard Deviation Category Using NCHS Reference Population (1989-90 Nutrition Module of Bangladesh)

Variable	Z-score Categories (Standard Deviations from the Median of the NCHS Reference Population)						
	-3.00 or Less	-2.99 to -2.00	-1.99 to -1.00	-0.99 to +0.99	1.00 to 1.00	+2.00 +more	Total
Age in completed months							
6-11(219)	1.2	13.5	34.9	48.2	2.2		11.5
12-23(407)	5.3	22.4	46.8	23.4	0.9	1.1	21.5
24-35(453)	1.0	14.0	43.4	40.7	1.9		23.8
36-47(418)	0.4	10.0	43.7	45.9			21.7
48-59(417)	0.1	8.7	49.3	41.5		0.3	21.4
Area of Residence							
Urban(671)	1.3	12.7	47.5	37.4	1.0	0.1	11.5
Rural(1243)	1.5	13.2	45.0	39.5	0.5	0.3	88.5
Sex							
Male(995)	2.2	13.1	45.5	38.8	0.5	0.0	52.0
Fem.(919)	0.7	13.1	45.1	39.7	0.7	0.6	48.0
Season							
Apr-June 1989(572)	2.3	19.0	45.2	33.1	0.2	0.3	28.2
July-Sept 1989(439)	2.2	11.7	50.2	35.4	0.5	0.1	28.2
Oct-Dec 1989(470)	0.8	14.8	43.8	40.2	0.4		25.1
Jan-March 1990(433)	1.1	8.0	39.1	49.3	1.6	0.9	18.4
All Groups	1.7	13.8	45.1	38.5	0.6	0.3	100.0
Sample	29	260	863	743	14	5	1914

Note: All percentages are calculated by weighting urban and rural observations by the multipliers derived in Appendix B.
Sample size in parentheses.

Table F29

Percent Distribution of Children age 6-59 months by WEIGHT FOR AGE Standard Deviation Category Using NCHS Reference Population (1989-90 Nutrition Module of Bangladesh)

Variable	Z-score Categories (Standard Deviations from the Median of the NCHS Reference Population)						
	-3.00 or Less	-2.99 to -2.00	-1.99 to -1.00	-0.99 to +0.99	1.00 to 1.00	+2.00 +more	Total
Age in completed months							
6-11(219)	21.5	35.2	32.7	10.1		0.6	11.5
12-23(407)	38.7	39.9	15.5	5.2		0.7	21.5
24-35(453)	29.5	36.7	25.1	8.5	0.3		23.8
36-47(418)	23.6	37.6	30.5	8.4			21.7
48-59(417)	19.9	41.6	32.2	6.2	0.1		21.4
Area of Residence							
Urban(671)	21.6	41.1	28.0	9.0	0.2		11.5
Rural(1243)	26.7	40.0	26.3	6.8	0.1	0.2	88.5
Sex							
Male(995)	23.9	40.9	28.6	6.2	0.2	0.2	52.0
Fem.(919)	28.6	39.2	24.2	7.9		0.1	48.0
Season							
Apr-June 1989(572)	29.0	36.5	28.7	5.5		0.3	28.2
July-Sept 1989(439)	27.8	40.5	24.4	7.0	0.3		28.2
Oct-Dec 1989(470)	23.5	40.9	25.8	9.1	0.1	0.6	25.1
Jan-March 1990(433)	27.5	36.8	26.9	8.7			18.4
All Groups	27.0	38.8	26.4	7.4	0.1	0.2	100.0
Sample	491	751	510	157	2	3	1914

Note: All percentages are calculated by weighting urban and rural observations by the multipliers derived in Appendix B.
Sample size in parentheses.

Table F30

Percent Distribution of Children age 6-59 months by HEIGHT FOR AGE Standard Deviation Category Using NCHS Reference Population (1985-86 Nutrition Module of Bangladesh)

Variable	Z-score Categories (Standard Deviations from the Median of the NCHS Reference Population)						
	-3.00 or Less	-2.99 to -2.00	-1.99 to -1.00	-0.99 to +0.99	1.00 to 1.99	+2.00 +more	Total
Age in completed months (sample size)							
6-11(308)	14.1	30.8	35.5	15.7	2.2	1.8	11.9
12-23(524)	42.2	31.2	17.6	8.2	0.8		19.5
24-35(586)	40.0	26.2	20.5	12.5	0.8	0.0	21.8
36-47(643)	45.6	28.2	17.4	8.1	0.5	0.3	24.6
48-59(614)	41.8	26.9	18.9	12.0	0.1	0.3	22.2
Area of Residence (sample size)							
Urban(1140)	28.2	28.9	25.6	15.7	1.1	0.4	10.9
Rural(1535)	40.6	28.3	19.9	10.2	0.7	0.3	89.1
Sex (sample size)							
Male(1400)	36.8	29.2	22.1	11.0	0.4	0.3	53.3
Fem.(1275)	42.0	27.3	18.8	10.6	1.0	0.4	46.7
Season (sample size)							
Sept-Oct 1985(716)	38.3	29.6	19.3	10.5	1.8	0.5	26.5
Jan-Feb 1986(621)	38.7	31.5	18.8	10.6	0.0	0.3	23.3
April 1986(657)	38.1	24.8	25.2	11.2	0.4	0.3	24.6
July 1986(681)	41.8	27.5	19.0	11.0	0.5	0.2	25.6
All Groups	39.2	28.3	20.6	10.8	0.7	0.3	100.0
Sample	944	764	598	336	23	10	2675

Note: All percentages are calculated by weighting urban and rural observations by 1271 and 7721 respectively.

Percent Distribution of Children age 6-59 months by WEIGHT FOR AGE Standard Deviation Category Using NCHS Reference Population (1985-86 Nutrition Module of Bangladesh)

Variable	Z-score Categories (Standard Deviations from the Median of the NCHS Reference Population)						
	-3.00 or Less	-2.99 to -2.00	-1.99 to -1.00	-0.99 to +0.99	1.00 to 1.99	+2.00 +more	Total
Age in completed months (sample size)							
6-11	23.8	33.6	28.6	13.4	0.6		11.9
12-23	41.3	35.2	19.1	4.4			19.5
24-35	37.2	37.1	18.3	7.3	0.0		21.8
36-47	27.0	46.9	19.7	6.4			24.6
48-59	23.2	43.4	26.5	6.8		0.3	22.2
Area of Residence (sample size)							
Urban(1140)	21.0	41.3	28.3	9.2	0.2		42.6
Rural(1535)	32.0	40.0	21.0	6.8	0.1	0.1	57.4
Sex (sample size)							
Male	27.7	40.4	24.4	7.3	0.1	0.1	53.3
Female	34.3	39.9	18.9	6.9			46.7
Season (sample size)							
Sept-Oct 1985	31.9	40.3	19.7	7.8	0.3		26.5
Jan-Feb 1986	25.6	43.8	22.7	7.6	0.0	0.2	23.3
April 1986	28.6	41.3	24.2	6.0			24.6
July 1986	36.4	35.6	21.0	7.0			25.6
All Groups	30.8	40.1	21.8	7.1	0.1	0.1	100.0
Sample	730	1085	646	210	3	1	2675

Note: All percentages are calculated by weighting urban and rural observations by 1271 and 7721 respectively.

Percent Distribution of Children age 6-59 months by WEIGHT FOR HEIGHT Standard Deviation Category Using NCHS Reference Population (1985-86 Nutrition Module of Bangladesh)

Variable	Z-score Categories (Standard Deviations from the Median of the NCHS Reference Population)						
	-3.00 or Less	-2.99 to -2.00	-1.99 to -1.00	-0.99 to +0.99	1.00 to 1.99	+2.00 +more	Total
Age (in completed months)							
6-11(308)	0.7	10.3	42.9	44.8	1.3		11.5
12-23(524)	2.9	25.3	49.4	21.8	0.6		19.5
24-35(586)	0.8	14.7	51.5	32.7	0.3	0.0	21.8
36-47(643)	0.3	10.8	49.0	39.7		0.2	24.6
48-59(614)		10.6	48.6	40.3	0.5	0.0	22.5
Area of Residence							
Urban(1140)	0.8	13.2	46.4	39.2	0.3	0.2	42.6
Rural(1535)	0.9	14.5	49.1	34.9	0.5	0.1	57.4
Sex							
Male(1400)	0.8	13.3	47.4	37.8	0.6	0.1	53.3
Fem.(1275)	1.0	15.6	50.4	32.7	0.3	0.0	46.7
Season							
Sept-Oct 1985(716)	0.9	16.4	50.6	31.8	0.0	0.2	26.5
Jan-Feb 1986(621)	0.5	8.6	47.4	42.9	0.5		23.3
April 1986(657)	1.2	13.9	49.3	35.0	0.5	0.0	24.6
July 1986(681)	1.0	18.0	47.8	32.5	0.7	0.0	25.6
All Groups	0.9	14.4	48.8	35.4	0.4	0.1	100.0
Sample	23	373	1283	983	10	3	2675

Note: All percentages are calculated by weighting urban and rural observations by 1271 and 7721 respectively.

Table F33

Percent Distribution of Children age 6-71 months by HEIGHT FOR AGE Standard Deviation Category Using NCHS Reference Population (1985-86 Nutrition Module of Bangladesh)

Variable	Z-score Categories (Standard Deviations from the Median of the NCHS Reference Population)						
	-3.00 or Less	-2.99 to -2.00	-1.99 to -1.00	-0.99 to +0.99	1.00 to 1.99	+2.00 +more	Total
Age in completed months (sample size)							
6-11(308)	14.1	30.8	35.5	15.7	2.2	1.8	9.8
12-23(524)	42.2	31.2	17.6	8.2	0.8		16.0
24-35(586)	40.0	26.2	20.5	12.5	0.8	0.0	17.9
36-47(643)	45.6	28.2	17.4	8.1	0.5	0.3	20.1
48-59(614)	41.8	26.9	18.9	12.0	0.1	0.3	18.1
60-71(608)	43.6	30.0	19.8	6.2	0.3	0.1	18.1
Area of Residence (sample size)							
Urban(1411)	28.9	29.3	25.7	14.7	0.9	0.5	11.0
Rural(1872)	41.4	28.6	19.8	9.4	0.6	0.3	89.0
Sex (sample size)							
Male(1725)	37.4	29.7	22.2	10.1	0.4	0.3	53.5
Fem.(1558)	43.1	27.4	18.3	9.9	0.9	0.3	46.5
Season (sample size)							
Sept-Oct 1985(866)	38.6	29.3	20.0	10.2	1.5	0.4	25.7
Jan-Feb 1986(768)	39.7	31.7	18.5	9.8	0.0	0.3	23.6
April 1986(819)	39.6	24.7	25.2	9.8	0.5	0.2	25.2
July 1986(830)	42.2	29.1	18.0	10.1	0.4	0.2	25.5
All Groups	40.0	28.7	20.4	10.0	0.6	0.3	100.0
Sample	1183	948	733	383	24	12	3283

Note: All percentages are calculated by weighting urban and rural observations by 1271 and 7721 respectively.

Percent Distribution of Children age 6-71 months by WEIGHT FOR AGE Standard Deviation Category Using NCHS Reference Population (1985-86 Nutrition Module of Bangladesh)

Variable	Z-score Categories (Standard Deviations from the Median of the NCHS Reference Population)						
	-3.00 or Less	-2.99 to -2.00	-1.99 to -1.00	-0.99 to +0.99	1.00 to 1.99	+2.00 +more	Total
Age (in completed months)							
6-11(308)	23.8	33.6	28.6	13.4	0.6		9.4
12-23(524)	41.3	35.2	19.1	4.4			16.0
24-35(586)	37.2	37.1	18.3	7.3	0.0		17.9
36-47(643)	27.0	46.9	19.7	6.4			20.1
48-59(614)	23.2	43.4	26.5	6.8		0.3	18.5
60-71(608)	24.9	49.1	21.6	4.4	0.0		18.1
Area of Residence							
Urban(1411)	19.9	43.9	27.4	8.6	0.2		43.0
Rural(1872)	30.9	41.5	21.1	6.4	0.1	0.1	57.0
Sex							
Male(1725)	27.0	42.5	23.4	6.9	0.1	0.1	53.5
Fem.(1558)	32.9	40.9	20.0	6.3	0.0		46.5
Season							
Sept-Oct 1985(866)	30.8	40.8	20.6	7.6	0.2		25.7
Jan-Feb 1986(768)	25.1	45.8	21.8	7.0	0.1	0.2	23.6
April 1986(819)	27.2	43.3	24.1	5.4			25.2
July 1986(830)	35.4	37.5	20.7	6.4			25.5
All Groups	29.7	41.8	21.8	6.6	0.1	0.0	100.0
Sample	860	1396	782	240	4	1	3283

Note: All percentages are calculated by weighting urban and rural observations by 1271 and 7721 respectively.

Percent Distribution of Children age 6-71 months by WEIGHT FOR HEIGHT Standard Deviation Category Using NCHS Reference Population (1985-86 Nutrition Module of Bangladesh)

Variable	Z-score Categories (Standard Deviations from the Median of the NCHS Reference Population)						
	-3.00 or Less	-2.99 to -2.00	-1.99 to -1.00	-0.99 to +0.99	1.00 to 1.99	+2.00 +more	Total
Age (in completed months)							
6-11(308)	0.7	10.3	42.9	44.8	1.3		9.4
12-23(524)	2.9	25.3	49.4	21.8	0.6		16.0
24-35(586)	0.8	14.7	51.5	32.7	0.3	0.0	17.9
36-47(643)	0.3	10.8	49.0	39.7		0.2	20.1
48-59(614)		10.6	48.6	40.3	0.5	0.0	18.5
60-71(608)	0.3	12.1	50.0	37.2	0.0	0.3	18.1
Area of Residence							
Urban(1411)	0.8	12.9	47.3	38.6	0.3	0.1	43.0
Rural(1872)	0.8	14.1	49.3	35.4	0.4	0.1	57.0
Sex							
Male(1725)	0.7	13.2	48.6	37.0	0.5	0.1	53.5
Fem.(1558)	1.0	14.9	49.5	34.3	0.2	0.1	46.5
Season							
Sept-Oct 1985(866)	0.8	15.4	50.2	33.3	0.1	0.2	25.7
Jan-Feb 1986(768)	0.4	8.6	47.6	42.9	0.4		23.6
April 1986(819)	1.2	13.9	50.0	34.4	0.4	0.2	25.2
July 1986(830)	0.8	17.5	48.2	32.8	0.6	0.0	25.5
All Groups	0.8	14.0	49.0	35.7	0.4	0.1	100.0
Sample	26	446	1589	1207	11	4	3283

Note: All percentages are calculated by weighting urban and rural observations by 1271 and 7721 respectively.

Table F36

Percent of Children age 6-71 months below 80 or 90 Percent of NCHS Reference Median Height-for-age, Weight-for-age and Weight-for-Height (1985-86 Nutrition Module of Bangladesh)

Variable	Height-for-age (below 90%)	Weight-for-age (below 80%)	Weight-for-Height (below 80%)
Age in completed months (sample size)			
6-11(308)	17.1	56.8	9.5
12-23(524)	49.1	78.3	17.2
24-35(586)	49.6	73.1	13.4
36-47(643)	59.7	79.0	6.8
48-59(614)	58.6	73.8	5.6
60-71(608)	61.1	79.7	5.2
Area of Residence (sample size)			
Urban(1411)	39.9	67.4	8.1
Rural(1872)	53.6	75.8	9.6
Sex (sample size)			
Male(1725)	50.6	73.4	8.0
Fem.(1558)	53.9	76.5	11.0
Season (sample size)			
Sept-Oct 1985(866)	51.6	75.0	11.5
Jan-Feb 1986(768)	53.0	74.2	4.5
April 1986(819)	50.4	73.8	9.1
July 1986(830)	53.5	76.5	12.1
All Groups	52.1	74.9	9.4
Sample	1567	2370	293

Note: All percentages are calculated by weighting urban and rural observations by 1271 and 7721 respectively.

Table F37

Percent of Children age 6-71 months by Gomez Classification Categories, 1985-86

Variable	Percent of Children by Weight-for-age Categories				
	Third degree	Second degree	First degree	Normal	Total
Age in completed months					
6-11(308)	7.5	33.7	41.9	16.9	9.8
12-23(524)	11.8	52.7	30.6	4.8	16.0
24-35(586)	9.4	46.8	36.6	7.2	17.9
36-47(643)	8.1	48.8	37.4	5.7	20.1
48-59(614)	7.1	49.2	38.1	5.6	18.1
60-71(608)	6.2	57.7	32.0	4.2	18.1
Area of Residence					
Urban(1411)	5.2	41.8	44.6	8.4	11.0
Rural(1872)	8.7	50.2	34.7	6.4	89.0
Sex					
Male(1725)	7.6	48.2	37.1	7.1	53.5
Female(1558)	9.1	50.6	34.2	6.1	46.5
Season					
Sept-Oct '85 (866)	9.1	48.7	35.0	7.2	25.7
Jan-Feb '86 (768)	5.4	49.3	38.2	7.1	23.6
April '86 (819)	8.3	47.4	38.4	5.8	25.2
July '86 (830)	10.2	51.7	31.7	6.4	25.5
All Groups	8.3	49.3	35.8	6.6	100.0

Note: All percentages are calculated by weighting urban and rural observations by 1271 and 7721 respectively. Sample sizes are reported in the parentheses.

Table F38

Distribution of Surveyed Households by Income (1989-90 Nutrition Survey)

Annual Income/Capita (in Taka)	Urban		Rural	
	Percent	Numb.	Percent	Numb.
Less than 2,000	1.4	12	4.6	69
2,000 - <2,500	1.9	16	8.3	125
2,500 - <3,000	3.8	32	10.9	165
3,000 - <4,000	16.7	141	25.4	384
4,000 - <5,000	17.9	151	21.1	319
5,000 - <6,000	14.9	126	10.5	159
6,000 - <8,000	20.5	173	12.2	184
8,000 or more	22.8	192	7.1	108

Table F39

Prevalence of Malnutrition defined by Percent of Reference Median Categories and Arm Circumference by Income and Expenditure Groups (1989-90 Bangladesh Nutrition Survey)

Annual Income	< 80% WA	< 90% HA	< 80% WH	Arm Cir <12.5cm	Arm Cir 12.5-13.4	Gomez Scale <60%	Gomez Scale 60-75%
Less than 2,000	82.4	70.7	8.5	14.2	32.1	7.9	54.3
2,000-<2,500	74.1	55.2	11.1	14.7	17.9	12.2	45.1
2,500-<3,000	74.8	58.1	8.1	14.8	19.4	9.5	47.6
3,000-<4,000	71.0	49.0	10.2	10.7	24.8	7.5	47.3
4,000-<5,000	76.4	53.3	9.5	11.1	20.4	6.5	50.0
5,000-<6,000	68.5	45.5	11.3	10.4	24.8	5.7	45.9
6,000-<8,000	72.6	45.6	11.9	8.3	28.7	7.1	47.0
>8,000	63.0	34.0	5.3	6.0	19.9	1.6	37.6
Annual Expenditure							
Less than 2,000	78.5	72.2	7.7	16.4	36.1	8.1	57.6
2,000-<2,500	79.8	56.8	10.7	14.3	19.7	10.5	46.8
2,500-<3,000	68.5	48.4	9.5	13.7	14.8	8.5	42.7
3,000-<4,000	74.2	52.0	9.2	11.2	23.8	7.5	50.1
4,000-<5,000	71.0	50.5	9.6	10.1	21.5	6.1	46.2
5,000-<6,000	76.9	49.0	10.7	11.5	26.7	8.0	52.1
6,000-<8,000	69.8	42.7	13.0	7.2	28.4	6.3	42.4
8,000-<10,000	71.6	41.1	4.6	6.8	24.0	1.5	45.1
10,000 or >	52.2	26.5	4.2	4.2	14.1	2.3	25.5

Table F40

Prevalence of Severe and Moderate Malnutrition by Per Capita Household Income and Area of Residence (1989-90 Nutrition Survey)

Income per capita	Stunting		Underweight		Wasting		Total%
	Sever	Moder.	Sever	Moder.	Sever	Moder.	
National							
Less than Tk 2500	45.9	29.2	31.9	38.8	2.0	12.8	13.2
Tk 2500 to 5999	36.2	29.8	26.2	41.1	1.6	13.2	62.3
Tk 6000 or more	28.4	31.7	22.8	38.1	1.0	13.1	24.5
Rural							
Less than Tk 2500	45.7	29.6	31.4	39.0	1.8	12.6	14.7
Tk 2500 to 5999	35.9	30.3	25.9	41.4	1.5	13.2	63.6
Tk 6000 or more	30.6	31.5	25.1	37.0	1.2	13.5	21.6
Urban							
Less than Tk 2500	44.4	22.2	33.3	37.0	3.7	14.8	3.2
Tk 2500 to 5999	35.5	27.2	27.2	40.4	2.1	13.7	50.2
Tk 6000 or more	19.8	33.3	15.0	42.0	0.3	11.7	46.6

Table F41

Prevalence of Malnutrition by Maternal Hand Cleaning after Defaecation (1989-90 Nutrition Survey)

Material used for hand cleaning (percent of total)	Height-for-age		Weight-for-age		Weight-for-ht	
	Severe	Moderat	Severe	Moderat	Severe	Moderat
Water only (41.4)	36.3	28.7	26.1	39.5	1.2	15.1
Soap+water (6.0)	14.4	35.6	9.2	38.5	1.1	9.3
Carbon+sand(52.6)	37.3	30.8	28.1	40.7	1.8	12.0

Fig. F1 Prevalence of Stunting by Annual per capita Expenditure broad group by area.

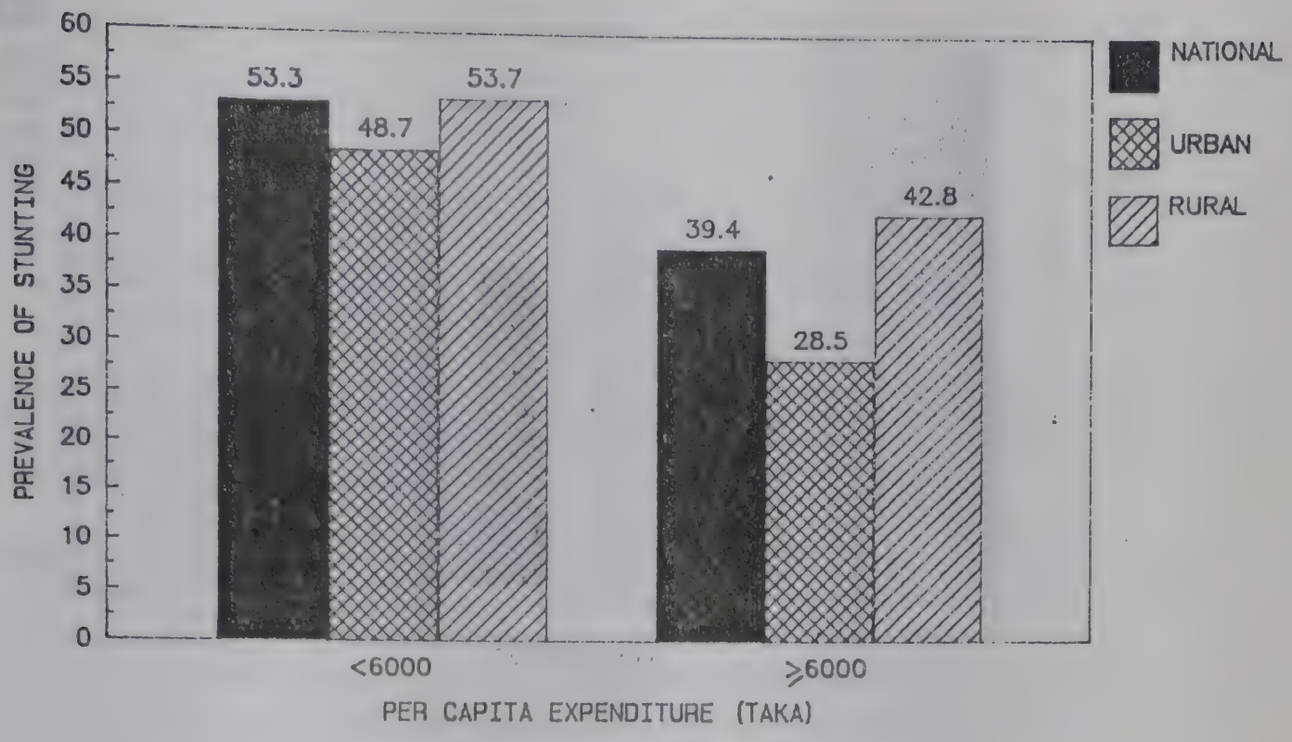


Fig. F2 Prevalence of Stunting by Maternal Education.

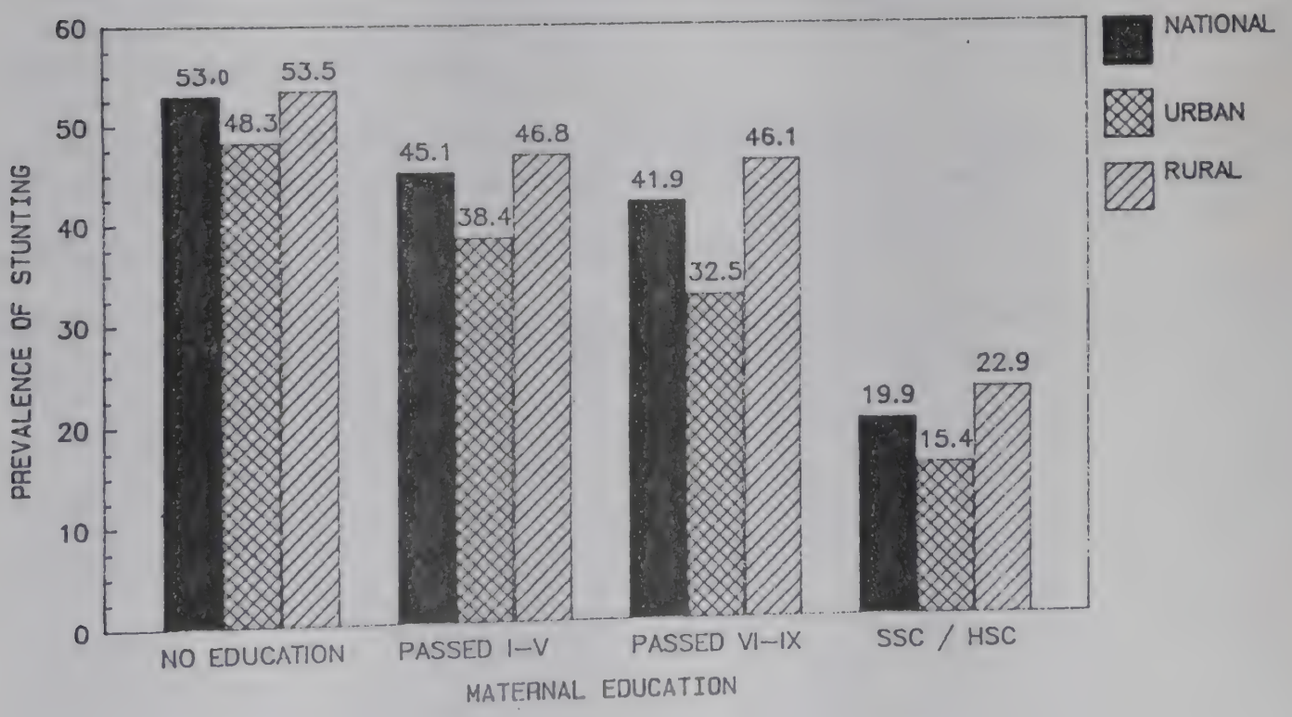
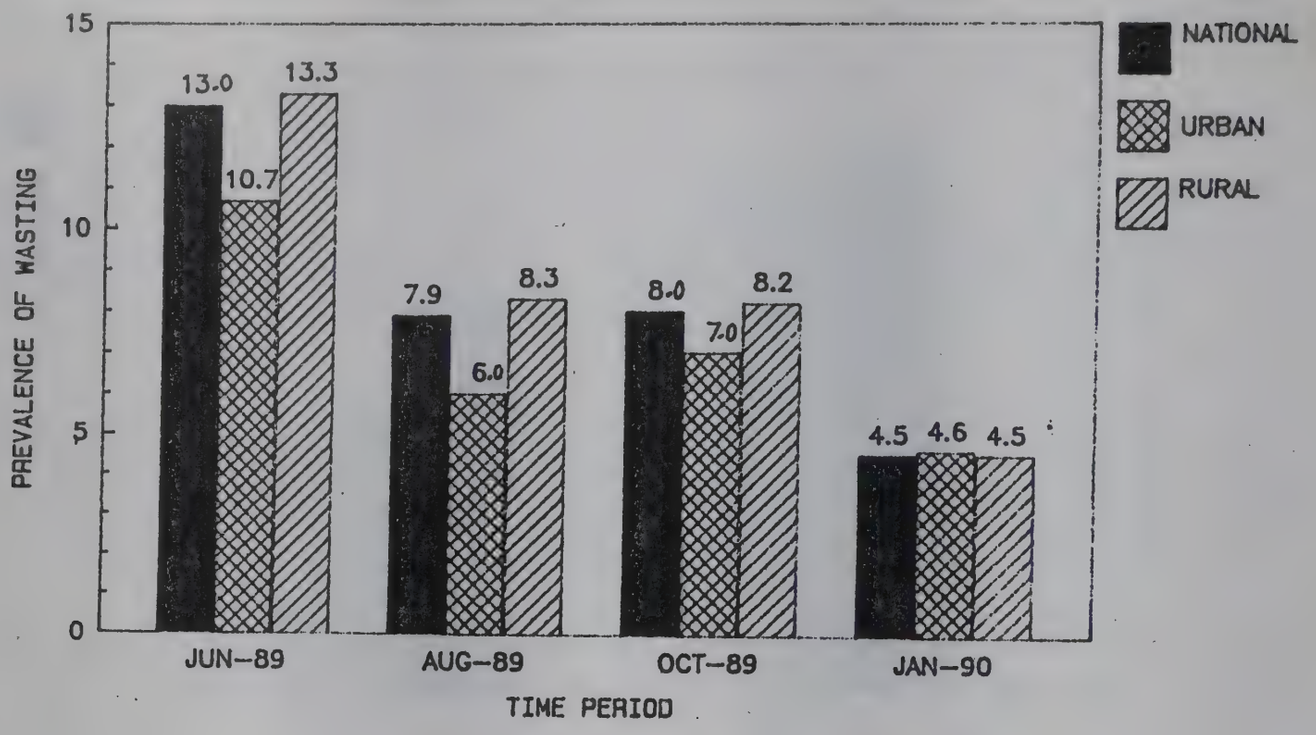


Fig. F3 Prevalence of Wasting by Area and Time period.



CALCULATION OF ANTHROPOMETRIC INDICATORS

Calculating Z-scores

Z-scores can be estimated by using the following equation:

Weight-for-age Z-score= (observed weight at age X months-median weight at age X month)/Standard Deviation at age X month.

Similarly, Hieght-for-age and weight-for-height Z-scores can be calculated using similar equations. For estimating height-for-age Z-scores, height of children at a given age should be compared and for weight-for-height, weight of children at a given height should be compared.

Example: Survey data show that a 25 month old boy has a height of 80 cm. To calculate the height-for-age Z-score for this child, we need to know the reference median height for a 25 month old child. The median is found to be at 88.5 cm. The reference height for children at -1SD, -2SD and -3SD are 85.1, 81.7 and 78.3 cm respectively. Since, the observed height of the child is below the median, we need to use the SD for the reference population below the median. Comparing the heights at -1SD and -2SD indicate that the SD below reference median is 3.4 cm. Therefore, the height-for-age Z-score for the child is:

(80-88.5)/3.4 = -2.5

Calculating Percent of Reference Median

Percent of reference median expresses the ratio of observed anthropometric measure and reference median measure in percentages. For example, percent median height-for-age can be calculated using the following equation

Percent height-for-age = 100 X (child's height for age)/ (reference median height for age)

Example: A boy aged 3 years 5 months has a height of 93.2 cm. The reference median height at this age is 98.4 cm. Therefore, the child's percent of reference median height-for-age will be:

(93.2/98.4) X 100 = 94.7 percent

CALCULATION OF NUTRITIONAL STATUS INDICATORS

1. Height-for-age

This is the height of a child expressed as a percentage of, or as a standard deviation from, the height of a 'reference' child of the same age and sex. Age must be known to the nearest month. The calculation is as follows :

$$\text{Percent height-for-age} = \frac{\text{Child's height for age}}{\text{Reference height for age}} \times 100$$

Example : A boy aged 3 years 5 months is measured for height (i.e. stature) which is 93.2 cm. The reference height for boys of this age is 98.4 cm. The calculation of this boy's height-for-age is :

$$\text{Percent height-for-age} = \frac{93.2 \text{ cm.}}{98.4 \text{ cm.}} \times 100 = 94.7\%$$

Therefore, this boy is 94.7% of the reference median of height-for-age.

Stunting (i.e. short for age) is defined as a height-for-age of less than 90.0% of the reference median. Therefore, the boy in the above example is **NOT** stunted, since he is 94.7% of reference.

2. Weight-for-age

Weight-for-age is calculated in the same way by expressing the child's weight as a percentage of the reference weight for a child of the same sex and age. The formula is as follows :

$$\text{Percent weight-for-age} = \frac{\text{Child's weight for age}}{\text{Reference weight for age}} \times 100$$

Example : a girl aged 27 months weights 9.8 kg. The reference weight for a girl of this age is 12.4 kg. The calculation of this girl's weight-for-age is :

$$\text{Percent weight-for-age} = \frac{9.8 \text{ kg.}}{12.4 \text{ kg.}} \times 100 = 79.0\%$$

Therefore, this girl is 79.0% of the reference median of weight-for-age.

Underweight (i.e. low weight-for-age) is defined as a weight-for-age of less than 80% of the reference median. Therefore, the girl in this example is underweight since she is 79.0% of the reference median.

3. Weight-for-height

The formula for weight-for-height is as follows :

$$\text{Percent weight-for-height} = \frac{\text{Child's Weight}}{\text{Reference weight for same sex and height}} \times 100$$

This variable addresses the question, "what is the weight of a child in comparison to the weight of the reference child of the same sex and height ?"

Example : a girl who is 98.5 cm. tall weights 13.0 kg. The reference median weight for a girl of the same height (i.e. 98.5 cm.) is 15.0 kg. Using the formula above.

$$\text{Percent weight-for-height} = \frac{13.0 \text{ kg.}}{15.0 \text{ kg.}} \times 100 = 86.7\%$$

Therefore, this girl is 86.7% of the reference median weight-for-height.

Wasting is defined as less than 80% weight-for-height. The girl in the above example is **NOT** wasted since she is 86.7% of the reference median weight-for-height.

APPENDIX-I

CONFIDENCIAL
ONLY FOR RESEARCH PURPOSE

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
BANGLADESH BUREAU OF STATISTICS
BANGLADESH SECRETARIAT
DHAKA

NUTRITION SURVEY QUESTIONNAIRE 1988-89

TIME PERIOD

MONTH	YEAR

AREA

URBAN	RURAL

DISTRICT	
UPAZILA/THANA	
MAUZA/MAHALLA	
HES. HOUSEHOLD NO.	
UNIT NUMBER	

SPECIAL INSTRUCTION FOR ENUMERATOR

HOW TO COMPLETE THE QUESTIONNAIRE FORM :

1. Ask the questions to the mothers/caretakers who have children 6-71 months old.

2. Complete Forms 1-4. Do not complete Form 5 and Form 2's questions 30 to 36.

3. Questions are on the left hand side with numbers. The boxes for responses are on the right hand side of the Form. You must complete the Form by recording the appropriate number in the boxes on the right hand side of the Form.

4. Please place the PSU and HES number on the top of each page.

5. Follow the manual, 'How to weigh and measure children' Step 9, 'How to write numbers' to write numbers properly.

6. To assess age of the child, follow the "Training and field manual" Step 5.3.

7. Instructions to the enumerator are give in brackets on the questionnaire Form.

8. Complete Form 4 for each child 6-71 months of age. Staple all Form 4's together to the main Form.

9. Begin a new Form (Take a new packet) for each eligible mother/caretaker in the same household.

(Please see the inner cover of the last page)

NUTRITION SURVEY QUESTIONNAIRE 1988-89

Form - 1 : PSU information	Coding Column
1. PSU Number	[| |]
2. Household expenditure survey H.H. No. (Go to question No. 4)	[| |]
3. Record Number	[1]
4. Interview Date	DAY [|] MONTH [|] YEAR [|]
5. Time interview begin (Enumerator : Go to question-7) A.M. [|] Hour P.M. [|] Minute	
6. Time interview end (Enumerator : Go to Form 4 question-39) A.M. [|] Hour P.M. [|] Minute	
7. BHSCP Household Number [| |]	
8. What is the distance from this PSU to the nearest upazila/zila sadar ?	K.M. [|] [ ]
9. What is the distance from this PSU to the nearest health centre/hospital ?	K.M. [|] [ ]
10. What is the distance from this PSU to the nearest Train/Bus/Steamer/Launch station ?	K.M. [|] [ ]

End of Form-1

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 2 Page - 1

Form - 2 : Household Information

Coding Column

11. What is the name of the head of this household ? _____

12. (Enumerator : Observe Sex of Household Head)

[1] Male [2] Female [ ]

13. Religion of this household
(Enumerator : Ask the question, if necessary)

[ ] Muslim [ ] Hindu [ ] Other [ ]

_____
(Specify : Print)

14. What is the total number of people in this household ? That is, how many people usually eat together in this household ? [|]

15. What is the total number of children less than 15 years of age in this household ? That is, how many children less than 15 years of age usually eat together in this household ? [|]

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 2 Page - 2
Drinking water and sanitation			Coding Column

16. What is your household's main source of drinking water ?

- [1] Tube-well
- [2] Tap
- [3] Open well (with wall)
- [4] Open well (no wall)
- [5] Pond/Tank
- [6] River/Canal
- [7] Other

[ ]

_____
(Specify : Print)

17. Do you purify your drinking water ?

[1] Yes [2] No

[ ]

(If no, go to question-19)

18. How do you purify your drinking water ?

- [1] Boil
- [1] Alum
- [1] Boil and Alum
- [1] Others

[ ]

_____
(Specify : Print)

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 2 Page - 3

Coding Column

19. What is your HH's main source of water for purposes other than drinking ? (e.g. Bathing, Washing etc.)

- 1 Tube-well
- 2 Tap
- 3 Open well (with wall)
- 4 Open well (no wall)
- 5 Pond/Tank
- 6 River/Canal
- 7 Other

.....
(Specify : Print)

20. What type of toilet facility is used by the members of this household ?

- 1 Open Space
- 2 Fixed open space
- 3 Bank of River/Canal/Pond
- 4 Municipal toilet (kacha)
- 5 Sanitary/Pit latrine
- 6 Flush
- 7 Other

(Specify : Print)

21. Is the toilet facility actually used ? (See the toilet facility)

- 1 Toilet facility used
- 2 Toilet facility not used (Review response to question 20)

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 2 Page - 4

Coding Column

22. What is done with excreta of children under five who do not use latrine used by the olders ?

- 1 Put into latrine by HH member
- 2 Left where child defaecated
- 3 Removed out side 'Bari (House) by HH member
- 4 Removed in a ditch (for fertilizer)
- 5 Same with olders
- 6 Others

(Specify : Print)

23. Do you use Iodised salt in your household ?

1 Yes 2 No 3 Does not know

24. Whether any member of this household knows to prepare salt and brown-sugar solution (ORS).
(Enumerator : Ask them to describe the process)

1 Yes 2 No

25. Have you consume your own planted vegetables ?

1 Yes 2 No

(If no, go to question no. 27)

26. Percentage of the consumed vegetables received from your own planted vegetables during the last 1 month.

- 1 All (100%)
- 2 Most (More than 50%)
- 3 Few (Less than 50%)
- 4 Nothing (0%)

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 2 Page - 5

Coding Column

27. Had any male/female visitor visited this household during the last 6 months who provided advice/service about Health, Family Planning, Mother/Childcare, Income generating/Bank, Social Welfare etc.

[1] Yes [2] No

(If no, go to question no. 29)

28. Please state, what type of service/advice they provided

[1] General Health [2] Family Planning

[3] Income Generating [4] Mother/Childcare

[5] Others

(Specify : Print)

29. Description of household head's living room :

(a) Materials for roof :

[1] Straw/Bamboo [2] Tali

[3] Tin/Wood [4] Cement

(b) Materials for wall :

[1] Straw/Bamboo/Jutestick [2] Mud/Rawbrick

[3] Tin/Wood [4] Brick/Cement

(Enumerator : Don't fill up this part in the field)

30. Total household income per year ____ Tk.

31. Total household expenditure per year ____ Tk.

32. Total expenditure on medical care per year ____ Tk.

33. Total expenditure on food per year ____ Tk.

34. Total operated land — Acre ____ Decimel ____

35. Total own land holdings (All member together) — Acre ____ Decimel ____

36. Occupation of household head

(Name of occupation) ____

End of Form -2

(Q. No. 30 to 36 will be trancripted from HES schedule)

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 3 Page - 1

Form - 3 : Mother/caretaker information — Coding Column

Monther/Caretaker information

1. PSU Number

2. HES household number

3. Record number — 2

4. Mother/caretaker name

_____
Print

5. Mother/caretaker I.D. number

6. (Enumerator : Ask the mother/caretaker) can you write a letter ?

[1] Yes [2] No

(If no, go to question no. 8)

7. Which class have you passed ?

[1] Never attended school

[2] Passed class I to V

[3] Passed class VI to IX

[4] Passed class SSC/HSC

[5] Passed class Degree or above

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 3 Page - 2

Coding Column

8. (Enumerator : Ask the mother/caretaker)
What is your marital status ?

1	Married (Husband stay permanently)	
2	Married (Husband not stay permanently)	
3	Unmarried	
4	Widow	☐
5	Divorced	
6	Deserted	

9. What do you use to clean your hands after defaecation ?

1	Water only	
2	Soap and water	
3	Ash/soil	☐
4	Other	

_____
(Specify : Print)

(Enumerator : Ask question No. 10 to 16 where the respondant is mother)

10. What is your age of marriage ? ☐☐
11. At what age your menses started ? ☐☐
12. At what age do you have your first child ? ☐☐
13. How many times you have been pregnant in your life ? ☐☐
14. How many alive children were born in your life ? ☐☐
15. Number of still births in your life ? ☐☐
16. What is the number of your present alive children ? ☐☐

End of Form - 3

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 4 Page - 1

Coding Column

Chidl I.D. information

1. PSU Number

2. HES household number (Go to question No. 4)

3. Record Number
(Enumerator : Ask the mother/caretaker) — 3

4. Name of the Child

_____ (Actual name)

_____ (Nick name)

5. Child I.D. Number

6. Mother/Caretaker I.D. Number

7. Sex of Child

1 Male 2 Female

8. Child birth date — Day | Month | Year

9. Birth date source

1 Documented (Birth record/Clinic record/Home record)

2 Stated by family member

3 Estimated (Use calendar of events)

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 4 Page - 2

Coding Column

10. What is your relationship to _____ ?
Child name

- 1 Mother
- 2 Father
- 3 Permanent caretaker (Not Parent)
- 4 Temporary caretaker (Relative)
- 5 Other

_____
(Specify : Print)

11. Have you received full dose tetanus vaccinations before the birth of this child ?

1 Yes 2 No 3 Does not know

12. Who was the attendant at the birth of _____ ?
(Child name)

- 1 Relative
- 2 Trained dai (Midwife)
- 3 Non-tranined dai (Midwife)
- 4 Prefessional Nurse, F.W.V. Doctor)

13. What instrument was used to cut the cord of the child ?

- 1 Bamboo part (Chata)
- 2 Blade/Knife
- 3 Does not know/remember
- 4 Other

_____
(Specify : Print)

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 4 Page - 3

Coding Column

14. How the instrument was cleaned ?

- [1] Only water
- [2] Boiling water
- [3] Antiseptic lotion (Dettol, Savlon, etc.) [ ]
- [4] Does not know/remember
- [5] Other

_____
(Specify : Print)

15. What is the serial number of this child among your/mother's alive children ? [ ]

Child feeding information

16. Is _____ now being breast fed ?
(Child name)

- [1] Yes (Go to question 19)
- [2] No (Go to question 17) [ ]

17. Has _____ ever been breast fed ?
(Child name)

- [1] Yes (Go to question 18)
- [2] No (Go to question 19) [ ]
- [3] Does not know/remember

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 4 Page - 4

Coding Column

18. At what age did _____ stop breast feeding ?
(Child name)

- [1] 0-5.9 months
- [2] 6-11.9 months
- [3] 12-17.9 months
- [4] 18-23.9 months
- [5] 24 + months
- [6] Does not know/remember

19. What was first solid food ?

- [1] Still breast feeding exclusively
- [2] Suji (Creame of wheat)
- [3] Rice powder/Rice
- [4] Solid food (Tin)
- [5] Hospotch (Khichuri)
- [6] Vegetables
- [7] Egg
- [8] Others

_____
(Specify : Print)

20. At what age _____ first/received solid food with breast milk
(Child name)

- [1] Still breast feeding exclusively
- [2] 0-2.9 months
- [3] 3.0-5.9 months
- [4] 6.0-8.9 months
- [5] 9.0-11.9 months
- [6] 12 + months
- [7] Does not know/remember

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 4 Page - 5

Coding Column

21. Has _____ ever received any immunizations/ vaccinations ? (Child name)

[1] Yes [2] No

[3] Does not know/remember

(Go to question no. 25)

22. Does this child has any immunization card ?

[1] Yes [2] No [3] Does not know/remember

(Go to question No. 25)

23. May I see the immunization card ?

[1] Immunization card seen

[2] Immunization card not seen

24. What immunizations/vaccinations he/she received ? (Give tick mark on appropriate box after checking for complete dose)

[01] Tetanus [02] Polio [04] B.C.G.

[08] Measles [06] D.P.T.

25. Has _____ had diarrhoea (atleast 3 loose stools in one day) during the last 3 months (Child name)

[1] Yes [2] No [3] Does not know/remember

26. How many times _____ had diarrhoea ? (Child name)

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 4 Page - 6

Coding Column

27. Was that attack of diarrhoea happened during the last 2 weeks ?

[1] Yes [2] No [ ]

28. What measure did you take that episode for the diarrhoea ?

[1] Home made saline (salt & gur solution)
[2] Saline packet (ORS)
[3] Rice powder [ ]
[4] Green coconut water
[5] Medicine
[6] ORS and medicine
[7] Others

_____
(Specify : Print)

29. Has _____ had a fever and severe cough during the last 2 weeks ? (Child name)

[1] Yes [2] No [ ]

30. Has _____ had measles during the last three months ? (Child name)

[1] Yes [2] No [ ]

31. Has _____ taken vitamin 'A' capsule during the last 6 months ? (Child name)

[1] Yes [2] No [3] Does not know/remember [ ]

(Enumerator : Show the sample)

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 4 Page - 7

Coding Column

32. What measure generally has been taken for sickness for

_____ ?
(Child name)

- 1 No treatment
- 2 Family treatment
- 3 Village doctor
- 4 Homeopathic
- 5 Private MBBS doctor
- 6 Health clinic/hospital
- 7 Others

_____
(Specify : Print)

33. (Enumerator : Check for oedema on both feet)
1 Yes 2 No

34. Child mid-upper arm circumference ___ . ___ CM

35. Child

1 Length (6-23 months)
2 Height (24-71 months) ___ . ___ CM

36. Child Weight : ___ . ___ KG

37. (Enumerator : Ask the mother/caretaker)
Do you have any more children 6-71 months old in this household whom we can measure ?

1 Yes (Go to new Form 4 for next child)
2 No

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 4 Page - 8

Coding Column

38. Are there any more mothers/caretakers with children 6-71 months old present in this household ?

1 Yes (Take a new questionnaire and fill up all the questions of Form-3 and Form-4)

2 No (Go to questions 6 of Form-1)

(Enumerator : Your assesment about the child)
Child appears :

1 Very thin

2 Thin

3 Reasonable

4 Over weight

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 4 Page - 9

Form checking (question 39)

39. (Enumerators : Print and sign your names in the spaces below with your assigned identification number)

I have completed and revfiewed this Form for clarify and completeness

(a) _____
(Print your name)

I.D. No

_____
(Sign your name)

(b) _____
(Print your name)

I.D. No

_____
(Sign your name)

End of Form - 4

End of survey in this household.

Check all Forms for this household and place in envelope.

For this PSU, label envelope with PSU number.

Go to next assigned household.

BBS Nutrition Survey 1988-89	PSU number	HES HH number	Form - 5 Page - 1

Form - 5 : Nutrition Form Checking Procedure :
For survey administrators only.

1. Action taken :

1	Form approved	
2	Error found and corrected by survey administrator	
3	Error found and referred to team for questioning	

If 1 Go to question 2 below

If 2 or 3 Form

1	Approved	
2	Rejected	

(Make note of this on Master PSU list)

2. Form checked by

_____
(Print your name)

_____
(Sign your name)

Date Day Month Year

End of Form - 5.

(Continued Form the inner cover of the first page)
Brief instructions on child measurement procedures.

---

10. (a) Do not ask questions 33-36 on form 4 you will do these.

    (b) First take the height/lenght of the child then measure weight.

    (c) Follow the instructions in the manual, "How to weigh and measure children".

11. (a) Measure one child at a time while you are completing form 4. For that child do not measure all the children in a household at the same time.

    (b) Before measuring a child, ask the parent to take of the child's clothes, cap, shoes, etc. Have the parent untill any interfering hairdos or take out any hair clips that would interfere with the measurement.

12. (a) Hang the weighing scale at eye level from a branch of a tree, rod, beam of a house or hook of a ceiling fan, etc.

    (b) Hang the child wearing the weighing pants on the hook under the scale. Measurer will call out the measurement and recorder will record the measurement in the box provided.

13. Measure length of children 6-23 months (Less than 2 years).
    Measure height of children 24-71 months.

04743

COMMUNITY HEALTH
LIBRARY
AND
DOCUMENTATION
UNIT

SURVEY PARTICIPANTS

The following personnel participated in the Child Nutrition Survey , 1989-90.

1.	Abdus Salam	Secretary, Statistics Division and Director-General, BBS.
2.	Survey Director: Md. Shahadat Hossain	Project Director, BBS
3.	Survey Co-ordinators:	
	Riti Ibrahim Ahsan	Deputy Director, BBS
	A.K.M. Abdus Salam	Statistical Officer, BBS
4.	UNICEF Consultant: Mahmud Khan	Tulane University, U.S.A.
5.	Survey Supervisors:	
	Alamgir Hossain	Assistant Statistical Officer, BBS
	Delwara Begum	Assistant Statistical Officer, BBS
	Bijoya Biswas	Assistant Statistical Officer, BBS
6.	Planning Committee:	
	Abdul Baten	Director, BBS
	Md. Delwar Hossain	Director, BBS
	Philip D. O'Brien	UNICEF
	Shirley Nuss	Advisor, UNDP
	Salma Khan	Joint Chief, Planning Commission
	M.A. Mabud	Director, PDU, Planning Commission
	Gole Afroz Mahbub	Director, Directorate of Women Affaris
	Mahmuda Islam	Dhaka University
	Shamima Islam	Dhaka University
	Alauddin Ahmed	General Manager, Grameen Bank
	Susan Davis	Ford Foundation
	Asfia Doza	CIDA

7. Data Processing:

Hamidur Rahman	Joint Director (cc), BBS
Mahmudul Haq	Statistical Officer, BBS
Abdul Wadud	Assistant Statistical Officer, BBS
Moklesur Rahman	Statistical Investigator, BBS

8. Enumerators:

Name	Designation	No. of data collection periods participated
Khodeja Begum	Statistical Investigator	4
Shahida Begum	Statistical Investigator	2
Nazneen Sultana Khan	Statistical Investigator	4
Ferdous Mahal	Statistical Investigator	4
Jahan Afroz	Statistical Investigator	3
Suchitra Chakraborty	Statistical Investigator	1
Morsheda Begum	Statistical Assistant	4
Rokeya Begum	Statistical Assistant	4
Fancy Ara Begum	Statistical Assistant	4
Kohinoor Hossain	Statistical Assistant	4
Setara Begum	Statistical Assistant	4
Zaheda Begum	Statistical Assistant	1
Md. Nazrul Islam	Statistical Investigator	4
A.K.M. Shamsuzzaman	Statistical Investigator	4
Md. Abdul Hakim	Thana Statistician	4
Md. Abid Mia	Statistical Investigator	4
A.K.M. Fruque Ahmed Mollah	Statistical Assistant	4
Shamsuddin Shah	Duel Data Operator	1

PLAN OF ACTION
FOR IMPLEMENTATION THE
World declaration on the survival, protection and development of children
IN THE 1990s

I. Introduction

II. Specific actions for child survival, protection and development

The Convention on the Rights of the Child
Child health
Food and nutrition
Role of women, maternal health and family planning
Role of the family
Basic education and literacy
Children in especially difficult circumstances
Protection of children during armed conflicts
Children and the environment
Alleviation of poverty and revitalization of economic growth

III. Follow-up actions and monitoring

Action at the national level
Action at the international level

Goals for children and development in the 1990s

The following goals have been formulated through extensive consultation in various international forums attended by virtually all Governments, the relevant United Nations agencies including the World Health Organization (WHO), UNICEF, the United Nations Population Fund (UNFPA), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Development Programme (UNDP) and the International Bank for Reconstruction and Development (IBRD) and a large number of NGOs. These goals are recommended for implementation by all countries where they are applicable, with appropriate adaptation to the specific situation of each country in terms of phasing, standards, priorities and availability of resources, with respect for cultural, religious and social traditions. Additional goals that are particularly relevant to a country's specific situation should be added in its national plan of action.

I. Major goals for child survival, development and protection

a) Between 1990 and the year 2000, reduction of infant and under-5 child mortality rate by one third or to 50 and 70 per 1,000 live births respectively, whichever is less;

b) Between 1990 and the year 2000, reduction of maternal mortality rate by half;

C) Between 1990 and the year 2000, reduction of severe and moderate malnutrition among under-5 children by half;

d) Universal access to safe drinking water and to sanitary means of excreta disposal;

e) By the year 2000, universal access to basic education and completion of primary education by at least 80 per cent of primary school-age children;

f) Reduction of the adult illiteracy rate (the appropriate age group to be determined in each country) to at least half its 1990 level with emphasis on female literacy;

g) Improved protection of children in especially difficult circumstances.

II. Supporting/sectoral goals

A. Women's health and education

i) Special attention to the health and nutrition of the female child and to pregnant and lactating women;

ii) Access by all couples to information and services to prevent pregnancies that are too early, too closely spaced, too late or too many;

iii) Access by all pregnant women to pre-natal care, trained attendants during childbirth and referral facilities for high-risk pregnancies and obstetric emergencies;

iv) Universal access to primary education with special emphasis for girls and accelerated literacy programmes for women.

B. Nutrition

i) Reduction in severe, as well as moderate malnutrition among under-5 children by half of 1990 levels;

ii) Reduction of the rate of low birth weight (2.5 kg or less) to less than 10 per cent;

iii) Reduction of iron deficiency anaemia in women by one third of the 1990 levels;

iv) Virtual elimination of iodine deficiency disorders;

v) Virtual elimination of vitamin A deficiency and its consequences, including blindness;

vi) Empowerment of all women to breastfeed their children exclusively for four to six months and to continue breastfeeding, with complementary food, well into the second year;

vii) Growth promotion and its regular monitoring to be institutionalized in all countries by the end of the 1990s;

viii) Dissemination of knowledge and supporting services to increase food production to ensure household food security.

C. Child health

i) Global eradication of poliomyelitis by the year 2000;

ii) Elimination of neonatal tetanus by 1995;

iii) Reduction by 95 per cent in measles deaths and reduction by 90 per cent of measles cases compared to pre-immunization levels by 1995, as a major step to the global eradication of measles in the longer run;

iv) Maintenance of a high level of immunization coverage (at least 90 per cent of children under one year of age by the year 2000) against diphtheria, pertussis, tetanus, measles, poliomyelitis, tuberculosis and against tetanus for women of child-bearing age;

v) Reduction by 50 per cent in the deaths due to diarrhoea in children under the age of five years and 25 per cent reduction in the diarrhoea incidence rate;

vi) Reduction by one third in the deaths due to acute respiratory infections in children under five years.

D. Water and Sanitation

i) Universal access to safe drinking water;

ii) Universal access to sanitary means of excreta disposal;

iii) Elimination of guinea-worm disease (dracunculiasis) by the year 2000.

E. Basic education

i) Expansion of early childhood development activities, including appropriate low-cost family- and community -based interventions;

ii) Universal access to basic education, and achievement of primary education by at least 80 per cent of primary school-age children through formal schooling or non-formal education of comparable learning standard, with emphasis on reducing the current disparities between boys and girls;

iii) Reduction of the adult illiteracy rate (the appropriate age group to be determined in each country) to at least half its 1990 level, with emphasis on female literacy;

iv) Increased acquisition by individuals and families of the knowledge, skills and values required for better living, made available through all educational channels, including the mass media, other forms of modern and traditional communication and social action, with effectiveness measured in terms of behavioural change.

F. Children in difficult circumstances

Provide improved protection of children in especially difficult circumstances and tackle the root causes leading to such situations.

Source: *The State of the World's Children, 1991*
UNICEF. P-60, 72, 73 and 74.

REFERENCES

Ahmad, K., N. Hassan, "On Nutritional Surveillance in Bangladesh", *The Bangladesh Development Studies*, Vol x, Number 3, September 1982, pp. 81-93.

Bairagi, R., "On the Best Cut-off Point for Nutritional Monitoring", *American Journal of Clinical Nutrition*, 35, 1982.

Bangladesh Bureau of Statistics, *Report of the Child Nutrition Status Module: Bangladesh Household Expenditure Survey 1985-86*, Government of Bangladesh, January 1987.

Bangladesh Bureau of Statistics, *Statistical Yearbook of Bangladesh, 1989*, Government of Bangladesh, 1989.

Behrman, J.R., A.B. Deolalikar, "Will Developing Country Nutrition Improve With Income" A case Study of Rural South India", *Journal of Political Economy*, 1987, Vol 95, No. 3, pp. 492-507.

Behrman, J.R., "Nutrition and Incomes: Tightly Wedded or Loosely Meshed" PEW/Cornell *Lecture Series on Food and Nutrition Policy*, Oct 4, 1988.

Carlson, Beverley, T.M. Wardlaw, *A Global, Regional and Country Assessment of Child Malnutrition*, UNICEF, Staff Working Paper Number 7, April 1990.

Habicht, J.-P., et al., "Overview: Indicators for Identifying and Counting the Improperly Nourished", *American Journal of Clinical Nutrition*, 35 (Suppl.), 1982.

Helen Keller International, Bangladesh, *"Nutritional Surveillance News Letter"*. Volume-1, Number-2, August, 1990.

Institute of Nutrition and Food Science, *Nutrition Survey of Rural Bangladesh, 1975-76*, University of Dhaka, 1977.

Institute of Nutrition and Food Science, *Nutrition Survey of Rural Bangladesh, 1981-82*, University of Dhaka, 1983.

Gopalan, C., "Stunting: Significance and Implications for Public Health Policy", in J.C. Waterlow ed. *Linear Growth Retardation in Less Developed Countries*, Nestle Nutrition Workshop Series, Vol 14, 1988.

Martorell, R., "Genetics, Environment, and Growth: Issues in the Assessment of Nutritional Status", in *Genetic Factors in Nutrition*, ed by Velasquez and Bourges, 1984.

United Nations, *Assessing the Nutritional Status of Young Children*, National Household Capability Programme, 1990.

United Nations, *How to Weigh and Measure Children*, National Household Capability Programme, 1986.

Waterlow, J.C., et al., " The Presentation and Use of Height and Weight Data for comparing the Nutritional of Groups of Children under the age of 10 years", *Bulletin of the World Health Organization*, 55, 1977.

World Health Organization, WHO Working Group, "Use and Interpretation of Anthropometric Indicators of Nutritional Status", *Bulletin of the World Health Organization*, 64 (6), 1986.

World Health Organization, *Measuring Change in Nutritional Status*; Geneva, 1983.

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